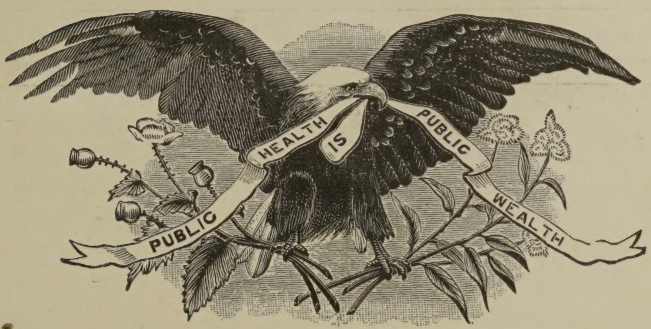
THE SANITARIAN,

A MONTHLY MAGAZINE

DEVOTED TO THE

PRESERVATION OF HEALTH, MENTAL AND PHYSICAL CULTURE.



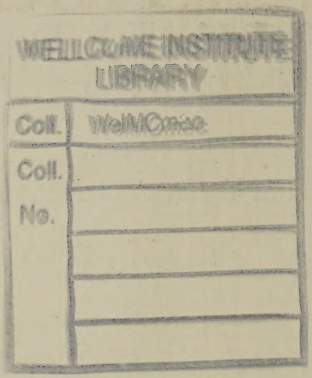
VOLUME XXXI. JULY TO DECEMBER.

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BROOKLYN, N. Y.: A. N. BELL.
1893.

3117.



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THE SANITARIAN.

JULY, 1893.

NUMBER 284.

SEWAGE DISPOSAL—BROOKLYN IN THE FACE OF SOME EXAMPLES.

A SUMMARY.

By T. P. CORBALLY, A.M., M.D.

WHEN men are congregated in great numbers in towns and cities, the most difficult question, as well as the most important, is the means of supplying a pure and wholesome water in convenient form and in sufficient quantity for private and public use.

This done, a problem hardly less important is the removal of the waste and polluted waters from the cities with the least inconvenience to the individual and with the least danger to the health of the community.

The Romans built magnificent aqueducts to give an abundant supply of pure water to the city, and this was made to supply a great number of fountains and public baths in all parts of Rome. They made the same provisions in most of the Roman provinces. Spain shows with pride the remains of the aqueduct at Segovia, one of the best preserved remains of ancient structures. It consists of one hundred and fifty-nine arches extending about half a mile in length, and is ninety-four feet high. In Gaul, near the present city of Nismes, the famous *Pont du Gard* passes over the river Gardon. It consists of three tiers of arches, the upper one nine hundred feet long and the whole one hundred and fifty-seven feet high.

The Romans worshipped the Goddess Cloacina, who, it is recorded, presided over the Cloacæ, which were large receptacles for all the filth and waste of the whole city. So numerous were they that Pliny says that Rome seemed to be sus-

pended between heaven and earth, and so strong were they and so massive the stones with which they were constructed, that for more than seven hundred years, though washed by torrents of water, they remained unharmed. The outlet to most of these was the Cloaca maxima, which emptied into the Tiber.

The officers who had charge of these immense Cloacæ, the ancient Board of City Works, were called *Curatores Cloacarum urbis.*

The Roman judges may have been at times somewhat arbitrary, but where the comfort, the health, and the lives of Roman citizens were in the balance, a decision like the following would not be expected :

"The Court of Appeals has reversed the judgment against J. R., convicted of misdemeanor in the Court of Sessions for maintaining a nuisance on Newtown Creek, in the nature of a fat-rendering place."

We never tire of boasting of the wonderful progress we have made in the arts and sciences, in mechanics and engineering. This is relatively true. But glance at the flats, once the bed of Bushwick Creek, as recently described in THE SANITARIAN, which have for more than a quarter of a century been the receptacle for the filth and putrefying animal matter from the slaughter-houses in Johnson Avenue, the filth poured upon it from the Johnson Avenue sewer, and consider how much improvement we have made on the Roman Cloaca. The ancient Romans were not Christians ; the gospel of purity had never been preached to them ; they could not boast of their Christian civilization, but the interests of commerce, manufactures, and productive industries could not have tempted them to allow, in the heart of an immense city, nuisances like Bushwick Creek, Newtown Creek, and the Gowanus Canal. It is certain that masses of filth of the same magnitude and equal danger to the health of the people could scarcely be found in any other part of the civilized world, except, perhaps, along the streams that supply Brooklyn and New York with potable water.

It is evident that changes have been made and are still necessary in other places, for Dr. Martin, speaking of the improved condition of the Croton water, says : "It must come

from the removal of many of the sources of pollution which existed in 1891 on the Sodom reservoir and on the banks of the East Branch." He adds: "The decreasing amount of nitrogenous matter, as we go from Red Bridge to Croton Falls, is an indication that the river now tends to purify itself, while in 1891 just the opposite condition existed, showing that at that time the *constant increment of sewage received* prevented the self-purification of the East Branch." Who could have believed that near the close of the nineteenth century the people of New York made their infusions of tea and coffee as well as other drinks with *diluted sewage!* Such is the inference from the quotation.

It is evident that the municipal authorities in London are not so susceptible to outside influence as they are in Brooklyn, for "the sewage of London, amounting to 200,000,000 gallons a day, is carried by the great sewers twelve miles below the city to large storage reservoirs at Barking and Crossness, on opposite sides of the Thames, where it is treated with one grain per gallon of sodium manganate and a few grains of chloride of lime. After precipitation of the solid matter, the effluent is discharged into the river at ebb tide in a clean and odorless yet far from wholesome condition."

The traditions of Roman civilization outlived the overthrow of society by the barbarians, and for centuries past the removal of sewage by means of underground sewers has been in existence in Spain, France, and other countries.

Since 1755 not only house-sewage, but all the animal waste of every kind, was sent direct to the sewers. This has continued to be the case and still exists in many of the public institutions, as the Invalides, the Mint, the Military School, La Salpêtrière, l'Hôtel Dieu, la Bicêtre. This system, now so common in all the large cities of Europe, as London, Edinburgh, Brussels, Berlin, Geneva, Frankfort, Rome, Pesth, and others, was, according to M. Teissier, carried to a far greater degree of perfection and at a far more remote period in Madrid than in the other cities of the Continent. Madrid, like Paris, has many local difficulties to contend with; like Paris, it is an inland city; and, like it, situated on a small river, the Manzanares, less than the Seine, and having less capacity for disposing of large quantities of filth.

*

The infection of the Seine has been deplorable, and is much regretted by every one interested in the healthfulness of Paris. Unlike London, the Parisians cannot construct sewers on both sides of the river for a dozen or more miles, and satisfactorily dispose of the sewage by casting it into the sea at ebb tide. The nearest tide-water available is the mouth of the Seine, more than one hundred miles distant, in a direct line. Yet this project has been under discussion for years; commissions have been appointed by the municipal authorities and by the Chamber of Deputies to devise the best means for the removal of the sewage, but they have failed to find a means to overcome the difficulties of the situation.

In 1886 a report was made to the Chamber of Deputies by M. le Dr. Bourneville, one of the Deputies and Chairman of the Commission. The subject of the report was "L'Utilisation Agricole des Eaux d'Égout et l'Assainissement de la Seine." The report states that "the time has passed when municipal bodies could neglect measures relating to public health." This is true of Paris and other European cities; it is not true of all American cities, as is evident from some of the statements made above, and from many others that could have been added to them. The street and the stream are no longer regarded as the natural or the proper receptacle for all kinds of filth. The sewer is a great improvement on the former barbarous methods of removing all kinds of waste, and where it can be properly discharged far superior to the best kinds of cesspools; but the report insists:

"The continual movement of the water in the sewers should be assured for the whole of the sewage of Paris, in order that the stagnation, which is accompanied with fermentation and infection, may be avoided."

The term *tout à l'égout*, which appears so frequently in the reports to the Chamber of Deputies and in the reports of the Conseil d'Hygiène, has been employed in almost every country in Europe. With the exception of the institutions mentioned above, the sewers of Paris—*égouts*—have, until 1891, conveyed nothing but surface drainage, so that the evil of discharging that material into the Seine was not so great as might be supposed. But for some years past many of the ablest sanitary engineers and some of the most distinguished

sanitarians have advocated the necessity of closing the cesspools and discharging everything into the sewers, that is *tout à l'égout*. In 1891 it was decreed that no more *fosse* or cesspools be opened, and that waste of all kinds be conveyed directly to the sewers. This has caused much bitter complaint from those living near the Seine below Paris. The amount of oxygen in the water has fallen to 6 c.c. at the Viaduct d'Auteuil, and the number of microbes has increased to 6000 and 7000 in the c.c.

It is below the bridge of Asnières—that is, from the point where the discharge from the grand collector of Clichy enters the river—that the infection is most manifest. At this point the right bank is represented as a real open sewer. The water is in a state of constant agitation from fermentation, is discolored and covered with a scum of a dirty, greasy appearance. The gas, called mephitic air on account of its fatal effects on animal life, is in great abundance. This gas is the more dangerous because it is tasteless and inodorous. At this point it amounts to 25 grammes in the cubic metre ; the oxygen has disappeared almost entirely, 1 c.c. in the litre ; it has been taken up by the decomposing matter, and the number of microbes has increased to 200,000 in the c.c.

Constant putrefaction goes on during the summer, causing the water of the river to bubble, bringing up the filth from the bottom to the surface, and giving off the mephitic gas often in the form of immense bubbles "sometimes a metre in diameter."

This Report of 1886 fills two hundred and twenty quarto pages, gives most interesting details of the changes that take place in the water of the Seine in consequence of the different degrees of pollution, and has elicited a good deal of discussion.

Other countries are as actively and earnestly engaged in the discussion of this subject as France. *La Salute Publica* of Perugia discusses the two systems, *Canalizzazione Unica*—that is, *tout à l'égout*—or separate systems for sewage proper and for surface water.

The *Giornale della Reale Societá Italiana d' Igiene* of November, 1890, has an article on "Sewerage of Milan." The Committee made three reports : "*On the general condition of*

the sewers in Milan; on the possibility of so systematizing the sewerage of Milan as to secure a constant circulation of water, and the sewerage of Milan in its relation to public health."

The *Hygiejniske Meddelelser*, the organ of the Public Health Association of Denmark, has an interesting article on the cholera epidemic of 1884 in relation to the sewerage of Kjobenhavn, which insists on the proper ventilation of sewers, and *La France Médicale* discusses "The Management of Sewerage in Paris and its Discharge into the Waters of the Seine."

The question was brought before the French Chamber of Deputies:

"The recent epidemic of cholera which raged so fiercely in Paris and in the suburbs has given rise to a violent campaign against the system known as *tout à l'égout*—all to the sewer. The opinion was that the interpellations of MM. Hubbard, Raspail, Michou, Hély d'Oissel, Haussmann, and Trélat would throw doubt on its propriety. Far from it; and if the reports of the sessions are read attentively, the surprise will be that nobody asked for the suppression of the *tout à l'égout*.

"This course of the debate will not surprise any one, however, who remembers the part taken by M. Trélat in the debates before the Société de Médecine Publique, and his great admiration for the projects of his late friend, M. Durand-Claye, whom he calls 'the hero who conquered and who led us to victory.'"

M. Durand-Claye, it may be remarked, was one of the earliest, most consistent, and most persistent advocates of the system, and, like other leaders, has always had his admirers and followers; the *Journal d'Hygiène* generally gave place to his communications.

"Trélat has, then, but one regret, which is, that the plan of preserving the sanitary condition of the Seine and of Paris, as it was proposed by M. Durand-Claye, and generally accepted for the last twenty years, has as yet been only partly put in execution; he complains, therefore, that the Government does not advance with sufficient rapidity, and he asks the Chamber to give it immediate attention, and to propose the measures necessary to insure its prompt execution.

"The other orators no longer attack the *tout à l'égout*, and

one of them, M. Hély d'Oissel, goes so far as to propose to make the *tout à l'égout* obligatory; he would establish a tax on scavenage, and he thinks the amount that would result from this tax would be sufficient to pay the interest on a loan for the construction of a canal or sewer to the sea, and also form a sinking fund, sufficient in time to pay off all the debt incurred for its construction. This is just what the Deputies of the Seine-et-Oise wish, and what M. Michou also advocates; it is the construction of a canal, a kind of residuary stream, which would conduct all the waters from the sewers of Paris to the sea without discharging any of it into the Seine. The advocates of this measure consider the purification of the sewage by means of the soil as a system to be deplored, absolutely insufficient, and incapable of affording a definite and satisfactory solution of the difficult problem. Is it not, they ask, Grennevilliers that has given us the cholera?

"Of all the discussion in the Chamber, it will be sufficient to report only what most especially interests the physician and the hygienist, and for that reason it will be sufficient to follow, step by step, the remarkable arguments advanced by the Government Commissioner, M. le Professor Proust On what principles, he asks, should the sanitary measures for a large city like Paris be based? They are three: First, to give the inhabitants pure water, free from all contamination and in sufficient quantity. That is what the authors of the interpellation ask for; that is what everybody wants. According to M. Hubbard, the city of Paris is insufficiently supplied with pure water, yet it must be admitted, as claimed by M. Haussmann, that great efforts have been made to give it all that is necessary. Besides, as M. Proust has remarked, the supply of drinking water in Paris is not less than in many other large cities, as London and Berlin. As for the communes in the suburbs, they will be supplied as far as possible with spring water for drinking, like London and Berlin.

"The second principle of sanitary provision for a city is to remove, as soon as possible, the waste arising from the necessary conditions of life and from all the industrial establishments. There can be no longer any question of collecting the waste or sewage in cesspools; this would be equivalent to a desire to preserve, in each house, the cause of infection, and

would be a permanent menace, a danger to public health. Should filtering tubs be used? No; for these filtering tubs, as has been well said, are but a caricature of the *tout à l'égout*, and, like the *pits*, they form a source of infection in the household. For all kinds of waste recourse must be had to the sewer, *tout à l'égout*. 'I say,' exclaimed M. Proust, 'that in one sense the *tout à l'égout* cannot be accepted, for the very simple reason that there are 500,000 cubic metres of sewage to be discharged every day; yet I do not know what you would do without it; but the *tout à l'égout* must not be the *tout à la Seine*.'

"Then follows the third principle in the sanitation of cities—the disposal of the waste matter by spreading the fertilizing elements on the fields devoted to agriculture, and turning nothing into the river but the water after it has been purified. What treatment should this sewage receive? Mechanical processes are excellent in cases of small cities, but they are absolutely impracticable when it is necessary to purify an enormous mass like that produced by Paris, amounting to 500,000 cubic metres a day; chemical means are equally inefficient.

"Purification by filtering through the soil is the only means really available. Employed under proper conditions and in accordance with rules laid down by the law—that is, used in the proportion of 40,000 cubic metres to the hectare—the distribution does not offer any danger to the public health nor to the transmission of contagious diseases.

"Indeed, it is well known that there exists between the *microbes saprogènes* and the *microbes pathogènes* a sort of vital relation; it may then happen that these latter are in part destroyed in the sewage. We also know the attenuating property of oxidation and of the solar rays; and, besides, it has been demonstrated by the experiments of Grancher, of Cornil, Vidal, and Chantemesse that the pathogenic microbes, and the microbes of typhoid-fever in particular, do not penetrate into the ground more than 40 or 50 centimetres; that they are destroyed by the earth, and that the water that drains from it has been purified. Should there be any reason to fear the vegetables cultivated in earth enriched in this way? The same experimenters spread on the surface of the earth great quantities of

bacilli, but have never been able to find any in the vegetables that grew in the same earth. Is there, then, any ground for fear that the emanations arising from ground that has been used as a means of purification for sewage might become a source of infection? There was not a death from cholera at Grennevilliers in 1884; that year cholera did not appear there until long after it had invaded other communes in the suburbs, and then there were very few deaths; and typhoid-fever causes no more deaths there now than formerly. And, again, in Berlin a hospital for convalescents has been erected in the middle of the field used for the purification of sewage, and the convalescents have not since experienced any greater amount of sickness. It may be affirmed, then, that the purification of sewage, if done properly, offers no danger to public health.

"But, the partisans of the canal to the sea say, 'You have not in the neighborhood of Paris the ground necessary for the purification of 500,000 metres of refuse every day.' It was easy for MM. Loubet, Trélat, and Proust to answer this objection successfully. To purify the sewage of Paris would require about 3650 hectares of land; but, according to the study of M. Adolphe Carnot, there are 35,000 around Paris which can be used for the purpose. Besides, in a sanitary point of view, the canal to the sea deserves some attention. If a canal from which the people along the river might use the sewage for the purpose of fertilizing their fields would be harmless, then it would be difficult to understand why that which was dangerous at Grennevilliers, at Achères, and in the Department of Seine-et-Oise would not be equally so in distant fields; but perhaps 'when we leave the district occupied by villas, the microbes have no effect on ordinary dwellings!' It may, however, be a closed canal or sewer going all the way to the sea. Such a canal would infect the shore, because the parallel currents in the English Channel would bring back the sewage to the shore, which has now too much detritus; it would be necessary also to erect works for purification, which would form new sources of infection. But the authors of the interpellation have asked for an open canal to the sea. Professor Proust very justly observed, 'That would be simply to serve the purpose of Paris; Grennevilliers would be irrigated,

then Achères, and lastly all the farms along the canal ; but the place for disinfecting is within easy reach.'

" The Chamber approved the measures proposed by the Government, which was done by accepting the proposition of M. Trélat.

" There now remains but one thing to be desired : that the works be finished as soon as possible, and that the sanitation of the Seine be no longer a *project*, but speedily become a reality."

OFFENSIVE WARFARE.—London *Truth* calls attention to the statements that the French drove the Dahomeyans out of the intrenchments by throwing in melinite bombs, the suffocating fumes of which not even Dahomeyans could stand.

It was the first battle trial of a bomb of which a good deal has recently been said. The battle of the future may be a trial of which army can stand the longer a series of terrific smells, and the bravest of the future will not be he who cares the least for wounds and death, but he who is best able to defy stenches. In that case the training of troops would be of a nature that would necessitate the location of their barracks as far as possible to leeward of civilian habitation, and their exercises and sham fights would no more draw a crowd, but temporarily depopulate the adjacent country. The reports of a battle would read peculiarly. Imagine a telegram like this :

" The enemy attempted to stink us out this morning, but were outstenched themselves in handsome style. The coughing and sneezing in their ranks as they retired in disorder showed how they suffered. The general in command left his false teeth on the field, and his chief of staff was so sickened by a bomb that burst right under his nose that he threw up everything but his commission. The repulse was complete, and it is not believed that the enemy will be well enough to attack till next week, at soonest."

However, even though stinkpots in the form of bombs should not come into general military use, they might be handy to admonish City officials that sewage is not the proper kind of filling for such places as Bushwick flats, surrounded by a populous community.

THE LASTING CHARACTER OF SOIL POLLUTION.

DR. LAUCIANI, in his work on ancient Rome, says that while a system of garbage collection existed under Roman rule, the disposal of refuse was as crude as it is in many modern towns and cities. That this disposal method was regarded as a nuisance at a very early period is made evident by the fact that sanitary laws were passed two thousand years ago that were intended to at least mitigate the trouble.

Some of these laws, graven on stone, were unearthed by Dr. Lauciani in his excavations, and the text of one of them reads, "C. Centius, son of Caius the Prætor, by order of the Senate, has set up this line of terminal stones to mark the extent of ground that must be kept absolutely free from dirt, and from carcasses, and from corpses. Here also the burning of corpses is strictly forbidden." On the bottom of this stone, in red letters, some probably near resident had written, "Do carry the dirt a little farther; otherwise you will be fined."

But this bounding line, beyond which any foul matter might be cast to putrefy under a Roman sun, was only four hundred feet from the city walls as erected by Servius Tullius. When Dr. Lauciani dug up these stones, on June 25th, 1884, and about two thousand years after the use of this area for refuse disposal, the soil was still so polluted and the stench arising from it so horrible that even his workmen, inured to such work as they were, found it absolutely unbearable and had to be relieved at frequent intervals.

The dumping-ground near the Esquiline Cemetery, including the present cemetery itself, was the greatest of these nuisances, and so long ago as the beginning of our Christian era the Roman rulers found it necessary to cover this area with twenty-five feet of soil and to convert it into a garden.

The long and active survival of disease germs in soil was also claimed in excavations made inside a cofferdam uncovering the bed of the Tiber alongside the bridge leading to the Castle of St. Angelo, in Rome. Here, in successive strata, were found coin and other relics fixing the age of the deposit down to the fourth century A.D. The soil as it was slowly

removed was piled upon an adjoining wharf and then taken away. When the very lowest and oldest of all the strata disturbed was so disposed of, an epidemic of typhoid fever broke out among the workmen and those living in the immediate vicinity. The result of careful examination is said to have shown that the trouble came from this lowest strata, and that disease germs that had been lying dormant at the bottom of the Tiber for nearly fifteen hundred years were still active for evil and proved their vitality. This statement, as far as the survival of the germs of typhoid are concerned, has been disputed. Considering the difficulty of detecting these germs in refuse recently deposited, there is ample room for doubt as to the exact point in the strata that caused the trouble observed.—*Engineering News.*

CELLAR OR NO CELLAR?

By Edward Atkinson.

In conversation many years ago with the late Dr. Agnew, of New York, of highest authority on hygiene, he told me that he thought that, for sanitary reasons, there should be no cellar under any dwelling-house. If there were, he remarked, the floor above should be most carefully sealed against the passage of any cellar-air into the house, while the entrance to the cellar should be wholly outside the house. This was in the beginning of my practice in dealing with the construction of factories, and it became one of the motives, aside from safety and economy, in treating the subject of the basement-floor.

I now venture to put a question which has become of considerable practical importance to architects: Ought there to be a cellar, in the ordinary sense in which that word is used, under the occupied parts of buildings of any kind, such as school-houses in which children are taught, factories in which men and women work, lower stories or basements of houses where much of the household work is done? In other words, ought not the lower story of almost every building to be put on well-drained ground above grade, both with a view to

economy in construction, and for sanitary reasons if for no other?

In factory practice all types of basement-floors built of timber and plank placed a few feet above the ground, in an excavation or even at grade when not open to the air on every side, with the expectation of ventilation beneath, have failed. It may be alleged that it has proved to be impracticable to ventilate a mere air-space under a basement-floor of a large building over the ordinary gravel or hard-pan of the soil, so as to prevent the decay of timber. In the best mill practice excavated basements or cellars, half to two thirds under ground, with cemented floors of concrete, have been sufficiently well ventilated; but that type of construction makes an expensive underground story, of which, as a rule, but a small part can be put to effective use. It is apt to cost as much or even more by the square foot of floor than any other floor-surface in the factory.

On the other hand, in many workshops and in some factories it is very desirable to be able to set machinery as nearly as possible upon the solid ground with timber and plank interposed between the ground and the machine, since, for many reasons, machinery may not be placed directly on concrete. This has been safely accomplished by making the concrete over a well-drained floor-space with asphaltum or coal-tar in place of cement. Timber and plank laid in cement will rot very speedily, and a cement concrete is a quick conductor of heat. An asphaltum or coal-tar concrete properly laid is a non-conductor of heat, an antiseptic, and is impervious to moisture; upon such a surface timber and plank laid solid last as well as in any other part of a factory building.

Under these conditions, the question arises, May not expensive basements or cellar-stories be done away with, except so far as it is either cheaper or more convenient to make an excavation for absolute use and not merely for the purpose of interposing a partly underground story beneath the main floor of a building?

In dealing with the condensation of moisture on interior surfaces, absolute success has been attained in preventing such condensation even over the Fourdrinier or the cylinder machines in paper-mills, from which the maximum quantity

of humidity is discharged in the process of converting wet pulp into dry and finished paper. Composite roofs made of proper materials six to seven inches thick have proved to be absolute non-conductors of heat, cold and moisture, and in their application to these machine-rooms, with proper ventilation to remove the steam, the condensation of moisture on the under side has been wholly done away with.

Reverse this process: May we not put a composite floor underneath the lower story of a building, reversing the order of materials which are used in the roof, and in this way put an absolute non-conductor of heat and moisture between the first occupied room and the well-drained soil below this composite floor? Why not? Many examples can be cited of complete success in this practice, which is now becoming common in our lines.

The following conversation occurred between myself and a very practical man not long since, in the discussion of a building in which he desired to put all his main work on a single floor. On my suggesting this method of construction, he said, "Oh, but I must have a cellar! It would not be fit to build such a building without a cellar."

"Very well," I replied, "then we will put a cellar under your main floor. You will desire to floor your cellar, will you not?"

"Certainly."

"What will you floor it with?"

"Cement or concrete."

"Would it not be better to use coal-tar or asphaltum?" explaining the reason.

"Certainly," said he, "we will adopt that floor."

"Then," said I, "you had better have a light cellar, had you not? You can afford to put your main floor considerably above grade for your purpose."

"Oh, yes, light by all means!"

"Shall we put it half-way out of the ground?"

"Yes, as much as that."

"Good!" said I. Next I asked, "But where you propose to put this building will it not cost you a great deal more to excavate than it would to keep up well toward the surface?"

"Yes," he replied; "very hard place to dig."

"Then," said I, "suppose we put the cellar two thirds above ground."

"Well," he replied, "why not?"

"Now, then," I said, "you have just back of your location a good gravel-bank; wouldn't it be a good deal less costly to grade up a foot and drain well than it would be to dig any hole of any kind?"

"Why, certainly," said he.

"Then," said I, "why not put your cellar-floor one foot above grade and drain it well?"

"Why," said he, "what has become of my cellar?"

My reply was, "You have put it in the best place possible, with the floor one foot above ground, and that cellar, wholly above ground, being placed under your main floor, will cost you less than it would to dig a great hole in the ground in which you will generate foul air and accumulate rubbish."

"But," said he, "you have given me a two-story building with two floors, and that is double the floor-space that I want."

"Yes," I replied, "I have given you a two-story building with two equally useful floors at less cost than you would have put into a one-story building with a deep and almost useless cellar under it. What are you going to do about it? Will you waste your money by digging a hole in the ground?"

"No," he said.

"Well, what will you do?"

"Why," said he—"why can't I leave out the upper story and bring the roof down so as to cover-in the first story?"

"Well," I remarked, "why not? I think you have landed where I meant you should. If you can cut off the passage of heat, cold, and moisture by properly constructing a composite floor directly upon well-drained ground, why do you want to dig a hole underneath it, at heavy cost?"

"But," said he, "I meant to store my coal in the cellar."

"Well," I said, "you can dig a hole for your coal if you want to; put it down in the hole in order to go through the work of bringing it up again. Why not put it in a shed in the rear on the level of the floor where you use it?"

"But," said he, "I meant to have put my sanitary appliances down below."

"Then," said I, "you would probably have made your cellar a great deal more foul than it would be under ordinary conditions. Better put them outside, for every reason, whether you have a cellar or not."

My practical man thought he had found for himself an excellent method of getting the room he needed on one floor at about three fifths or perhaps one half of what he expected it would cost him on his own plan for one floor and cellar. Yet there are still many persons who think that they must have a cellar under the main floor.

To what extent can such persons be persuaded to build their cellars wholly above grade by at least one foot?

In other words, the question put to architects and, through them, to owners, may well be, if you have no use for a cellar, why put one under your building? A building costs a certain sum by the unit of the square foot of floor, counting every floor. If the use of only one floor is called for, why put a more expensive floor ten feet below it by digging a hole in the ground?

If it is expedient to use two floors and to have all the light, air, and ventilation one can get on both, why make one a basement partly below ground and partly above? Why not put them both above grade?

Of course these questions apply to open spaces where it is not necessary to go down deep into the bowels of the damp earth or high up into the air in order to get floor-space. On a broad area floor-space on one floor can be provided at less cost than by excavating or going high into the air; on two floors at the lowest cost at which floor-space can be provided in any way.

Then why provide either cellar or basement floors below grade except in deference to a superstition derived from a period when the right way of constructing a floor directly upon the ground had not been devised?—*American Architect, February 25th*, 1893.

SOME RECENT ADVANCES IN WATER ANALYSIS AND THE USE OF THE MICROSCOPE FOR THE DETECTION OF SEWAGE CONTAMINATION.*

By George W. Rafter, Rochester, N. Y.

It is quite within the memory of nearly every member of the Buffalo Microscopical Club to recall the time when chemical analysis alone was the only available method for determining the sanitary value of a drinking water. Then came the development of methods of bacteria culture, accompanied by a clearer appreciation of the necessity, before deciding as to the wholesomeness or unwholesomeness of a given water, of a thorough study of the environment, or, in other words, of a study of the various pollutions affecting the sources from which a supply is drawn ; and finally the latest, and possibly quite as important as any, the development of a method whereby the minute life other than the bacteria can be quantitatively enumerated with an accuracy which, while not absolute, is still sufficiently so for the practical purpose of study of sanitary significance and comparison.

It is unnecessary to occupy time on this occasion either in describing just how the quantitative enumeration of the microscopical forms in potable water is actually accomplished, or in pointing out the part taken by the author in the final working of what is known as the Sedgwick-Rafter method of making the microscopical enumeration. It is sufficient to simply refer those interested to the original paper with detail in the proceedings of the Rochester Academy of Science.† The method there described was also exhibited at the working session of the Buffalo meeting of the American Microscopical Society, and is referred to in the proceedings for that year (1889).

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* Read before the Buffalo, N. Y., Microscopical Club, December 12th, 1892.

† "Biological Examination of Potable Water." Proceedings Rochester Academy of Science, vol. i., pp. 34-44.

There are, however, a few points of historical interest which may be casually referred to here—namely, in relation to the work of the Microscopical Section of the Rochester Academy of Science, and the essential assistance received from a number of friends in that body, without which it is probable the methods of microscopical study of the minute life would have been somewhat less perfect than they are at the present time. The points thus deserving record are briefly as follows :

About seven years ago the author became satisfied that the microscope was capable of yielding a large amount of useful information in regard to the natural history of water supplies, and, in pursuance of this view, began a somewhat extensive study of the biology of the water supply of the city of Rochester. At that time, aside from some work done by Mr. Vorce at Cleveland, and by Professor Kellicut and Mr. Mills at Buffalo, almost nothing had been done in the way of systematic study of all the forms present in public water supplies. The observations of these gentlemen may be found recorded in the Proceedings of the American Microscopical Society, and it is therefore unnecessary to further refer to them at this time, except to say that some of their generalizations as to (1) the permanency of certain forms at all seasons of the year, and (2) as to the actual quantity of microscopical life in Lake Erie water, are of interest and value, and have largely furnished the incentive for more extended observations on the part of the author.

A few months' study was sufficient to show that the task undertaken was a very large one, and accordingly, in May, 1886, the author presented a paper to the Microscopical Section of the Rochester Academy of Science, in which it was suggested that the section take up the systematic study of the Hemlock Lake water supply of the city. This was followed by a second paper in December of the same year, with the result that finally the section undertook the proposed study, continuing without interruption for nearly three years. To Major William Streeter, Drs. M. L. Mallory and J. Edward Line, Mr. A. L. Dumond, and other members of the Microscopical Section of the Rochester Academy of Science, the success of the work was very largely due ; and while the present writer, by reason of mostly being the author of the

various papers put forth, has received the greater portion of whatever credit attaches to the work, it is nevertheless just that the gentlemen in question should receive recognition as joint participants with the author in what has apparently turned out to be on the whole an exceedingly useful study in new fields. In making this special acknowledgment, the author further takes occasion to say that he hopes any other person beginning similar studies may be blessed by the counsel of such tried friends as those whose services are here gratefully acknowledged.

The work included (1) weekly examination of samples of water drawn from the mains in different parts of the city, (2) frequent examinations of the water of the two reservoirs of the Rochester system, and (3) a study of samples taken from different parts of Hemlock Lake, as well as from the influent streams and various parts of the tributary drainage area of the same. Incidentally, for purposes of comparison, studies were also made of many of the streams and other bodies of water in the vicinity of Rochester, as, for instance, the Genesee River, Lake Ontario, Irondequoit Bay, etc.

The complete details of these various studies are too extensive to be given at length, and we may merely refer to some of the results at Hemlock Lake, where plant forms have been identified as follows :

Chlorophyceæ, 20 ; Cyanophyceæ, 15 ; Desmidiæ, 14, and Diatomaceæ, 41, making a total of plant forms of 90. The maximum quantities of some of these minute plants per 100 cubic centimetres are, Protococcus, 2000 ; Anabæna, 20,000 ; Cœlosphærium, 34,000 ; Asterionella, 40,000 ; Cyclotella, 60,000 ; Fragillaria, 25,000 ; Stephanodiscus, 60,000. The total number of animal forms is 92, of which 3 are classed as Spongidæ ; 10 as Rhizopoda ; 29 as Infusoria ; 2 as Hydroida ; 14 as Rotifera ; 3 as Polyzoa ; 21 as Entomostraca ; 1 as Malacostraca, and 10 as insect larvæ. As to maximum quantities of animal forms observed, we find among infusoria, Dinobryon, 12,000 ; Glenodinium, 25,000, and Vorticella, 9600.

The quantities of minute life present in Hemlock Lake, while apparently large, are in reality quite small, as will be readily appreciated by reference to a statement of the number

present in Ludlow Reservoir, Springfield, Mass., where the following maximum quantities per 100 cubic centimetres have been observed : Of the diatoms, Asterionella and Melosira, 405,600 in April, 1890 ; Cœlosphærium, 157,600 in August, 1889 ; Chlorococcus, 322,400 in October, 1889 ; of animal forms the infusorian Dinobryon showed 364,400 per 100 cubic centimetres in February, 1890. But even the large quantities of minute life found at Springfield are dwarfed into comparative insignificance by the results of a series of examinations of the water supply of Newport, R. I., as given by Dr. Drown in a recent report, from which it appears that on August 31st, 1891, there were present in Easton's Pond, one of the sources of supply for Newport, the large number of grass-green algæ (Chlorophyceæ) of 677,750 per 100 cubic centimetres ; on September 11th, 1891, there were found 927,400 ; on October 8th the number had fallen to 675,700, but subsequently again rose until the enormous maximum was attained on January 18th, 1892, of 1,428,600 per 100 cubic centimetres. Diatoms were present on the same date to the amount of 200,700 per 100 cubic centimetres, giving a total of diatoms and grass-green algæ of 1,629,300.

On August 31st this water contained bacteria to the amount of 23,300 per 100 cubic centimetres ; September 11th, 49,100 ; and on October 8th, 708,000 per 100 cubic centimetres.

Of the blue-green algæ (Cyanophyceæ) there were present on August 31st, 271,000 per 100 cubic centimetres ; on September 11th, 266,800 blue-green algæ ; on October 8th, 8400 blue-green algæ, while on January 18th, 1892, blue-green algæ were entirely absent.

This series of analyses of samples from Easton's Pond brings out the importance of a knowledge of the microscopical forms, in order to appreciate the significance of the bacteria. Thus on August 31st and September 11th there were only 23,300 and 49,100 bacteria per 100 cubic centimetres, while the sum of the grass-green and the blue-green algæ on the same dates is 548,750 and 1,194,200 respectively. On October 8th blue-green algæ had fallen to 8400, while bacteria had risen to 708,000 per 100 cubic centimetres.

Dr. Drown's report gives a series of analyses of samples from South Pond and Paradise Pond, also sources of supply

for the city of Newport, which further illustrate the same points.

While the foregoing, however, may be deemed sufficient for present purposes, it may be still remarked that this Newport report, by reason of presenting (1) a detailed study of the environments; (2) the physical properties of the water; (3) the chemical constituents, and (4) a quantitative enumeration of the living forms, including the bacteria, may be considered a complete sanitary analysis, the first, so far as the author is aware, that has been published of any city water supply aside from those made under the auspices of the State Board of Health in Massachusetts. The Massachusetts reports thus far have not presented the number of bacteria, hence the Newport report in reality marks, in a very satisfactory way, a new era in the sanitary analysis of potable water. The Board of Health of Newport, in causing such a study of the water supply of the city to be made, has set an example of intelligent appreciation of the recent advances in this department, which, it is hoped, will bear fruit, not only in increased healthfulness to the citizens of Newport, but in increased incentive to similar work in other towns.*

The water supply of the city of Boston may be mentioned, in this connection, as one where the microscopical life has been studied in considerable detail. The following statement of organisms in Lake Cochituate, one of the sources of supply to that city, is based upon weekly observations for two years, and gives a list of the predominant organisms with the number per 100 cubic centimetres sometimes reached or which may be commonly looked for:†

Asterionella	200,000	Anabæna (sterile)	15,000
Tabellaria	100,000	Cyclotella	10,000
Melosira	75,000	Microcystis	5,000
Protococcus	30,000	Monas	5,000
Synedra	25,000	Cœlosphærium	2,500
Crenothrix	20,000	Clothrocystis	2,500

* For detail of the Newport water supply, see a report to the Board of Health of the city of Newport R. I., on the character of the public water supply; by Thomas M. Drown, M.D., Professor of Analytical Chemistry in the Massachusetts Institute of Technology, 1892. SANITARIAN, Vol. XXVIII., p. 394.

† Sixteenth Annual Report of the Boston Water Board for the thirteen months ending January 31st, 1892, p. 66.

In the foregoing is set forth some of the results attained by use of the new method of quantitative enumeration of the microscopical forms present in potable water. Let us now briefly examine another phase of the question.

At the present time the development of new and more exact methods of water analysis has produced, in matters relating to the conservation of public water supplies, what may be termed a transition state, in which the progressive movement is, as we have already seen, clearly in the direction of a study from every possible point of view, rather than from one or two, as has been until recently almost universally the case; this change is so marked that a review of some phases of the advance in methods of studying the sanitary value of potable water may be profitably made.

It is to England that we are chiefly indebted for the most of our early knowledge of sanitary properties of water. The large amount of work in the way of study of the pollution of streams by sewage and manufacturing which has been accomplished there within the last fifty years has easily placed England first in the list for improvements in this branch of sanitary knowledge. In proof of this we have only to consider (1) that, until within the last decade, chemical analysis has furnished the only scientific method of assisting judgment in the selection of the source of a public water supply; and (2) that of the three methods of chemical analysis which have been generally used, two, at any rate, are purely English developments, while the third, though originating elsewhere, has perhaps received its most extensive application in the hands of an eminent English chemist. The three systems of chemical analysis which are here referred to are the "albuminoid ammonia process" of Wanklyn, Chapman & Smith, the "combustion process" of Franklin & Armstrong, and the "permanganate process" of Forchhammer, which in England has been adopted and extensively used by Dr. Tidy. All of them have been developed and reduced to practical value within the last twenty-five to thirty years. Previous to that time, about all attempted in water analysis was the determination of the total solids and the total organic matter, this latter determination being absolutely without reference to the question of quality. The recent examination of a large num-

ber of published analyses has forcibly impressed upon the writer the almost entire lack of appreciation of a necessity for information as to what may be termed the detail of the organic constituents which prevailed as recently as thirty to forty years ago.

A few far-seeing students had, indeed, perceived clearly that the current analyses of the day were considerably short of revealing the thing necessary to be known—namely, what may be termed the natural history of potable water. Chief among such must be mentioned Dr. Hassall, whose illustrated memoir on the water supply of London was published in 1850. This, however, was too far in advance of the day of its publication, and stood alone for twenty years as the first guide-post on a new road to a more exact knowledge of the detail of the natural history of potable water.

In the mean time, a number of eminent chemists had clearly perceived the necessity for additional information in regard to the condition of the contaminating organic material more or less present in all waters, and various refinements in chemical methods of study were accordingly made ; for instance, the distinction between the free and the albuminoid ammonia of the Wanklyn, Chapman & Smith process ; the distinction between the organic carbon and the organic nitrogen of Frankland's combustion process, etc. Without going too much into the detail, let us consider some peculiarities of the combustion process which are of historical value in the present connection and at the present time.

Probably, among the working water analysts of two decades ago, Dr. Frankland perceived, more clearly than any other, the necessity for distinguishing between the contamination resulting from the waste products of animals, etc., and that produced either by purely vegetable growth in water itself, or by surface water coming in contact with vegetable matter in its ordinary course or flow ; hence we find as distinctive features of the combustion process the determination of the organic carbon, the organic nitrogen, and the estimation of the previous sewage or animal contamination, a knowledge of these three together with that of the free ammonia, nitrites, nitrates, and chlorine constituting in Dr. Frankland's view a nearly complete natural history of water.

With regard to the organic carbon and the organic nitrogen, Dr. Frankland remarks in the Sixth Report of the Rivers Pollution Commission (1874) that the animal or vegetable origin of the organic matter contained in potable water may, in most cases, be judged by the relative proportions in which the two elements, carbon and nitrogen, occur in the organic matter, and that in waters contaminated by organic matter "the smaller the absolute quantity of organic nitrogen, and the less the proportionate amount as compared with organic carbon, the better is the quality of the water, as regards present or actual pollution, and the less likely is the water to contain any organic matters of animal origin." The fact, however, that waters which are entirely uncontaminated by animal matter may still contain a considerable quantity of nitrogen derived from vegetable matter, either growing in the water, or with which it has been in contact, is referred to, and, in Dr. Frankland's view, satisfactory methods of interpretation sufficient for every possible case pointed out.

The most interesting feature of Dr. Frankland's system, as well as the most important in the present connection, is the method by which he determines whether or not a given water has been previously contaminated by sewage or other animal contamination. In making this determination, the following circumstances govern. In the first place, throwing out of consideration the free nitrogen of the dissolved atmospheric air, we may say that the element nitrogen exists in water either as a constituent of ammonia, organic matter, or in combination with mineral substances, as nitrites and nitrates. In these several forms the nitrogen constitutes a record of not only the present pollution, but of that which is past ; thus the organic nitrogen furnishes the record of that portion of the pollution which is a matter of the immediate present, the ammonia a record of that which is past, but so recently as to still constitute an element of danger, while the nitrites and nitrates indicate the pollution which formerly existed, but which probably has been rendered innocuous through the action of the forces producing nitrification. In regard to these forces it may be noted that their action is comparatively rapid in the pores of an open soil, while in the water of rivers and lakes they act much more slowly. The nitrites and nitrates,

when once formed, however, mark the complete reduction of the nitrogen to the mineral state and, remaining dissolved in the water, constitute " a record of the sewage or other analogous contamination to which it has been subjected since its descent to the earth as rain." In order to obtain a concrete expression for the amount of the previous contamination, the amount of total combined nitrogen contained in solution in 100,000 parts of average London sewage was taken as a standard of comparison. Various analyses show from 7.06 to 8.363 parts of total combined nitrogen in 100,000, but for simplicity a round number—10—was assumed as the total amount of combined nitrogen in solution in 100,000 parts of average London sewage. Inasmuch as this number is considerably higher than that furnished by actual analysis, it is clear that the assumed standard is only a conventional one ; hence the indications derived from it, while comparable among themselves, are still only comparable with London sewage by the use of a correction factor, although as used by Dr. Frankland such a correction has not been applied, chiefly because of the essentially varying composition of the sewage itself ; from hence it results that a comparison made at one time would only be relatively true at another. Moreover, different series of results compared with a varying standard could only be compared among themselves by applying vexatious and complicated corrections. The conventional standard was therefore fixed upon as the most convenient, all things considered, that could be obtained.

In estimating the previous contamination in terms of this standard, Dr. Frankland points out that it is necessary to bear in mind that rain-water contains nitrogen in the form of ammonia, nitrites, and nitrates. According to the analysis of twenty-one samples collected at Rothamsted, the amount of nitrogen in these forms was 0.047 parts in 100,000 parts of water. The number 0.032 as obtained from a more limited number of analytical determinations was, however, fixed upon for reasons which are made clear in the Sixth Report of the Rivers Pollution Commission, but which need not be specially considered here.

In arriving at the amount of the previous sewage or animal contamination in any given sample, the amount of nitrogen

in the form of ammonia, nitrites, and nitrates is first ascertained by the ordinary processes, and from their sum the number 0.032—representing the nitrogen of the rainfall in these forms—taken ; the remainder represents the nitrogen which has been derived from any oxidized animal matters with which the water has been in contact. For instance, a water containing 0.326 parts of nitrogen in the form of ammonia, nitrites, and nitrates has obtained (0.326 — 0.032) = 0.294 parts from animal matters. According to the assumed standard of comparison, this amount of combined nitrogen is contained in 2940 parts of average London sewage ; hence such a sample of water is said to exhibit 2940 parts of previous sewage or animal contamination in 100,000 parts ; or 100,000 pounds of the water have contained at some time an amount of organic animal matter equal to that found in 2940 pounds of the assumed London sewage.

With regard to the other principal determinations of the combustion method, the weight of opinion at the present time apparently is that the attempt to distinguish between the organic carbon and the organic nitrogen is only partially successful. The determination of the total organic nitrogen is, however, by itself a valuable one, which would without doubt be generally used in place of the albuminoid ammonia determination of the Wanklyn process, if it were not for the difficulty of working the method.

The detail of the more important phases of Dr. Frankland's system of analysis is given in the foregoing somewhat at length, because, all things considered, it may be taken as the most elaborate attempt to exhibit the natural history of water by chemical means only that has ever been made. That it has failed to do all that was hoped for it is only due to the complexity of the subject, which does not admit of a complete understanding from any one point of view, but which must be approached from at least four sides—namely, the environmental, physical, chemical, and microscopical—in order to really encompass anything like the whole of the many difficult questions which it involves.

The tendency of the present day is to individualize the various sources of contamination, the dream of the biological investigator being, at any rate, that, through study of the life

history and pathogenic effect of the numerous species of minute life which we now know inhabit all waters, we may finally determine, largely by the aid of the microscope, whether or not any given water supply contains anything deleterious to health. In the view of this class of investigators, the microscope is of quite as great or even greater importance in water examinations than the chemist's more elaborate array of retorts and appliances for determining equivalent volumes. This view, too, it may be said, is now generally held by advanced chemists, and we accordingly find such using the microscope as a check on the otherwise uncertain indications of the chemical analysis. It should not be overlooked, however, that the four distinct lines which have been already indicated should be pursued in any case where a complete sanitary analysis is desired, and hence the rational statement of the matter is that the microscopical examination takes equal rank with the chemical. The author, in the course of a somewhat extended study of sources of water supply, has had occasion to frequently decide the question of relative sanitary value of different sources, and has yet to see the case where an intelligent use of the microscope in conjunction with a study of the environment would not furnish decisive evidence on which to decide for or against. The method of examining a source of proposed water supply which he has found the most satisfactory is to spend some little time tramping over the drainage area with a portable outfit for the microscopical examination as his only companion. A sample can be taken, filtered, and the enumeration made in an hour or an hour and a half from the time of taking. In this way we learn to a certainty the actual number of forms of minute life present, there being absolutely no opportunity for changes to take place. That this point is of considerable practical importance will be readily appreciated after one has collected a few samples in mid-summer, one portion being examined at once and the other left standing for one or two days before the examination. In the latter case the microscope will be very likely to show large quantities of amorphous matter which will not appear in the portion examined immediately after collecting. Nor is this all. If the same portions are examined chemically, it will be found that the proportionate amounts of free and

albuminoid ammonia will be quite different in the second case from what they are in the first. Nevertheless the author believes it is nearly universal practice to not examine samples of water chemically until the second or third day after collection, by which time, unfortunately, such changes have taken place in many cases as to render any deductions from the amounts of free and albuminoid ammonia present relatively worthless. This remark is especially true in case sewage contamination is present.

And this brings us to another point of great practical importance—namely, as to the possibility of definitely determining by the microscope whether or not sewage contamination is actually present in a given sample of water. For a long time the matter of sewage contamination has been a stumbling-block in the way of satisfactory interpretation of the results of chemical analysis. We have already seen the cumbersome methods of expressing the fact of sewage contamination resorted to by Dr. Frankland in his combustion process, and we may further remark that the extensive application of this method made to polluted river water by Dr. Frankland has been the cause chiefly of the adoption of what must be considered an unnecessarily high standard of purity in the case of streams from which a study of the environment shows sewage contamination to be absent. In the same way Wanklyn, working largely upon sewage-polluted London wells, fixed upon an arbitrary standard, which, while properly applicable to such wells, is little worth when applied to streams and surface waters generally.

At the present time it may be affirmed that in the case of surface waters the microscope will usually show evidence of sewage contamination when such exists. The cases in which it may not furnish definite evidence are those in which, by reason of the water flowing considerable distances, sedimentation has been sufficiently thorough to remove the kind of evidence which the microscope is fitted to detect. Even when this has occurred an examination of the deposit of mud at the bottom will easily lead to the detection of the specific constituents of sewage. This part of our subject, although capable of yielding practical results of the very highest value, is nevertheless, with the exception of a small amount of

work in Germany and England, as yet almost entirely undeveloped.

The beginning of the use of the microscope for detecting sewage contamination in potable water dates from the researches of Professor Nothnagel, who published, about fifteen years ago, the results of an investigation into what may be termed the fixed constituents of human excrements. Professor Nothnagel found that there were four substances of almost constant occurrence in fæcal matter—namely, muscular tissue, yellow elastic tissue fibre, shreds of fibrous substances, such as fasciæ, and finally spiral and free vegetable cells. All of these are so far capable of resisting the action of the digestive fluids that they pass away in the fæcal matter either in an unchanged or so far unchanged state that they may be as easily recognized as are other substances susceptible of definite microscopical determination.

But this is not all. The researches of Professor Tidy in England and of Dr. Drown in this country have shown that sewage, when discharged into a stream, and especially into a sluggish flowing one, not only quickly removes the dissolved oxygen, but its effect is, further, such as to keep the oxygen permanently, nearly, or actually *nil* near the bottom. Deposited sewage may, therefore, remain at the bottom of a polluted stream for months almost without change, and may be, by the use of the microscope, identified as such through the medium of the method here discussed. Thus far two English microscopists—namely, Drs. Beale and Sorby—are about the only persons to pursue this line of study to a really practical conclusion. A paper by Dr. Beale may be found in the *Journal of the Royal Microscopical Society* for February, 1884. In it Dr. Beale gives in detail the method of examining sewage muds which he pursued in the case of twenty-five samples from the Thames mud banks, together with the more important results which he obtained. His results are qualitative purely.

Dr. Sorby about the same time worked out a method of quantitatively determining by the use of the microscope the amount of the fixed constituents of sewage in a given volume of water, and applied it in an elaborate investigation of the pollution of the river Thames, undertaken at the instance of what is known in sanitary literature as the Royal Commission

on Metropolitan Sewage Discharge of 1884. In his communication to that commission Dr. Sorby gives in great detail the results of a large number of determinations of the fixed constituents of human excrements, as found in samples of Thames water taken at different stages of the flow. Rather curiously, however, he fails to point out just the method pursued in obtaining his quantitative results, and in consequence the work has never received the attention which its importance would otherwise have secured for it. Nevertheless Dr. Sorby's great reputation as a working microscopist may lead us to accept his results as essentially correct, even though we lack the detail of the method pursued. Some of his more important conclusions may be briefly stated as follows :

1. There is no serious difficulty in determining with the microscope the relative amount of human fæces or of horse manure from street washings in any given sample of water or deposit of mud.

2. The moderately fine portion of human fæces, amounting to about 31 per cent of the whole, is the portion which yields the greatest amount of valuable information. This portion contains vast numbers of more or less perfectly recognizable fragments of muscle derived from the meat eaten as food. The fragments are not in the condition of cooked meat, but are so modified by the digestive process as to be no longer soluble in a warm acid solution of pepsine. They are also insoluble in a dilute warm solution of caustic potash. Again, they resist decomposition for a far longer time than cooked meat, when kept in water ; at the same time showing the microscopical structure of muscle with such marvellous perfection that they cannot be confounded with any other object.

3. Human fæces vary in composition according to the food eaten. Green vegetables furnish many spiral vessels, while fæces from oatmeal abound in the hairs of oats.

4. Horse excrements play the most important part in street washings. Their most characteristic objects are hairs of oats and spiral vessels derived from straw or green fodder.

5. It is quite within the possibilities of our present knowledge to prepare a microscopical scale of comparison by the use of which to estimate the amount of sewage contamination in any given sample of water.

The foregoing discussion presents a few of the points to be taken into account in determining the various circumstances affecting the quality of a public water supply. Without pretending to legitimately make all the deductions from this inadequate presentation of some of the elements of the subject, we may still lay the following down as practical points to be borne in mind when study in questions of sanitation in relation to public water supplies—namely :

1. The circumstances affecting the quality of a public water supply are of an exceedingly complex nature. So true is this that what appears to be a cause of disease at one time may possibly become under different conditions the source of immunity from danger. Hence a knowledge of the detail is indispensable for a really rational decision in nearly every case.

2. The most complete system of chemical study thus far devised is the combustion method of Dr. Frankland, but the difficulty of working it has prevented its general adoption in actual work. At the present time, by reason of the perfection of the systems of biological examination, the simpler albuminoid ammonia process of Wanklyn answers all the requirements of the purely chemical study.

3. Dr. Frankland's method of estimating the previous sewage or animal contamination is interesting as showing how completely he realized, twenty years ago, the value of more definite information about the natural history of water.

4. The working out of exact methods of studying the bacteria about ten years ago was a great step in advance in determining the sanitary relations of potable water.

5. The working out in the last three years of exact methods of studying the microscopical life is another step which bids fair to advance our accurate knowledge of the sanitary relations of potable water as much or even more than a knowledge of the bacteria. For this latter advance we are chiefly indebted to the liberal policy of the Massachusetts State Board of Health.

6. At the present time all studies point to the conclusion that a water once polluted with the excrements of either domestic animals or human beings is unsafe for domestic use for a long time thereafter.

7. As between the pollution of domestic animals or human beings, the weight of recent evidence is, other things being equal, that the pollution from animals is the source of the greater danger, for the reason that intercommunicable infectious diseases are more virulent when communicated from animals to men than from men to animals. It is found, too, that domestic animals are quite as liable to infectious diseases as are human beings.

8. The self-purification of a stream, pond, or lake receiving sewage may proceed from (*a*) the chemical force of oxidation ; (*b*) the biological force of reduction of organic matter to harmless forms through the medium of life processes, and (*c*) sedimentation. An apparent self-purification may also be attained by mere dilution. In regard to oxidation and biological reduction, the difficulty at present is to determine when they are complete ; while sedimentation is likely to be a source of grave danger by reason of furnishing a field in which disease germs may reproduce themselves indefinitely.

9. It is clear from the preceding that running streams which receive sewage may be unsafe sources of water supplies for many miles below the point of inflow. Incidentally it may be remarked that the recent investigations in relation to the typhoid germ which have been made in Massachusetts and other places have enforced this point in another way, which need not be specially referred to at this time.

10. Absolute immunity can be obtained by drawing water supplies from areas entirely free from animal pollution of every sort and kind. When this is impracticable intelligent supervision may be relied upon to reduce somewhat the danger of pollution.

11. Filtration will also improve the quality of polluted water supplies.

12. As a fair practical summation of the whole matter, we may say, in conclusion, that the water-works manager of the present day, in addition to being a business man and a working engineer, needs to be something of a chemist and biologist as well, to this extent, that he may be able to quickly appreciate all the circumstances affecting the quality of a public water supply.—*American Microscopical Journal, May*, 1893.

THE AMERICAN CLIMATOLOGICAL ASSOCIATION.

TENTH ANNUAL MEETING, HELD AT PHILADELPHIA, MAY 25TH, 26TH, AND 27TH, 1893.

THE session opened with the address of the President, Dr. R. G. Curtin, of Philadelphia. He extended a cordial welcome, and reviewed the history of the Association. He pointed out the value of the material added to the literature of climatology, and referred to the recent deaths of members. He made the following suggestions: that the discussions be reported by a competent stenographer; that a Committee on Health Resorts be appointed, to collect data and report yearly to the Society as to elevation, meteorology, etc.; that a Committee on Mineral Springs be appointed, to collect information as to the composition of waters and their medicinal uses; that the Association take up for consideration important national questions, such as a rigid quarantine to bar out epidemics, the preservation of forests, a national leper colony; that the standard of membership be raised and a limit placed to the number of members; that the interest of well-known bacteriologists be enlisted in the work of the Association.

Dr. Curtin also read a paper on "Angina Pectoris and Morbid Anginose Symptoms Caused by Heavy Blows, Crushing Injuries, and Chronic Inflammation around the Heart." In a considerable number of cases of angina pectoris that had come under observation, there was a history of antecedent traumatism, or an association with chronic inflammatory disease around the heart. In a second group of cases there was a history of traumatism. In both, the symptoms may have been dependent upon the existence of pericardial adhesions.

In this connection it is interesting to note how common it is to find the layers of the pericardium adherent at autopsies, in cases of aneurism and organic disease of the heart associated with anginal symptoms. In those sufficiently strong to respond to treatment, the prognosis is quite good; but this should be guarded in the old, intemperate, or overworked.

In most cases nitro-glycerine relieves the symptoms, but this drug often fails because it is not given frequently enough. In a bad case it should be given every hour or two. It will ward off paroxysms, but it is not curative. The hypophosphites act as good curative agents, and should be given continuously for months. Cod-liver oil is often beneficial, especially in cases in which flesh has been lost. Arsenic is a tonic and a curative agent. Protection to the chest by added clothing, or a cotton, flannel, or woollen pad is to be recommended. In extreme cases the patient should be kept in bed for rest and protection. The diet should be restricted and work diminished. Temperance in all things should be directed.

Dr. J. H. Musser, of Philadelphia, related the case of a patient, forty-three years old, who had a severe attack of pericarditis, and afterward, while in apparently good health, had an attack of angina pectoris. This was the beginning of an illness that resulted fatally at the end of two months from cardiac aneurism. The angina pectoris was due to thrombosis of the coronary arteries.

Dr. Quimby detailed the case of a woman of twenty-eight or thirty, who was greatly disturbed by exercise, but who lived an easy and comfortable life for eight or ten years, sitting in bed. She had distinct adhesions from suppurative pericarditis.

Dr. A. H. Smith, of New York, expressed the opinion that a large proportion of cases of angina pectoris may be traced to a disproportion between the muscular power of the heart and the resistance to be overcome.

Dr. Leonard Weber, of New York, pointed out the distinction between true angina and pseudo-angina. In three cases of true angina pectoris there was sclerosis of the coronary arteries consequent upon gout, syphilis, or over-exertion in athletics or severe mechanical work.

Dr. F. P. Henry, of Philadelphia, referred to a case of aortic stenosis and insufficiency, in which one or more attacks of angina occurred daily. The attacks are not brought on by exertion, nor can they be brought on voluntarily; the patient is constantly in bed, and yet never fails to have an attack during the day. After being placed on tincture of aconite the attacks ceased, and have not recurred for eight weeks.

The man is now up and going about, and practically well. On one occasion he was greatly shocked by the escape of an inmate of the ward for the detention of insane patients, who ran into the ward in which this patient was ; but he had no attack, though there must have been a great disproportion between the tension of the vessels and the action of the heart.

Dr. J. M. Anders, of Philadelphia, read a paper entitled "Seasonal Influence in Erysipelas, with Statistics." As the result of a study of two thousand and ten cases from various hospitals, the conclusion was reached that erysipelas is, to a considerable extent, dependent upon seasonal influence. Certain climatic elements have a decisive, though perhaps slight, causative influence. Temperature has least, and mean relative humidity the most intimate connection with the disease. A low barometer and mean relative humidity invariably correspond with the period in which the number of cases is largest ; and the highest relative humidity with the months with fewest attacks. Erysipelas is not, to the same extent as chorea and rheumatism, related to the seasonal variations in the totality of human illness. The mortality-rate is little, if at all, affected by seasonal influence.

Dr. S. D. Risley, of Philadelphia, read a paper on "Ocular Disturbances Due to Climatic Influences." He pointed out the difficulty of differentiating between climatic influences and racial peculiarities, on the one hand, and the habits and peculiarities of immediate environment, on the other hand. Statistics and clinical reports of ophthalmologists in Europe and different sections of our own country show that certain forms of conjunctivitis and corneal disease are more prevalent in one part of the world than in another. In Europe, cases of trachoma are much more numerous than in Philadelphia ; and in the western section of our own country a relatively large number of patients is under treatment for rebellious conjunctival disease. This is to be accounted for by the prevalence of high winds, carrying clouds of dust, by exposure to strong light in agricultural districts, or the strong snow-light in winter. The deleterious influence of the alkali plains on mucous membranes has been pointed out. This alkaline dust doubtless causes chronic inflammation of the conjunctiva and cornea.

Another form of ocular disturbance due to climatic influence is of malarial origin. The conjunctiva, cornea, and deeper tunics are affected. The most frequent affection is that of the cornea, which does not conform to other recognized forms of corneal disease. This is periodic in character, and recovery takes place under antiperiodic doses of quinine or arsenic. On the day of the paroxysm, the eye is much worse ; and as there is ordinarily tissue-change (corneal epithelial abrasion), the eye is not well between attacks, as there is not time for repair. In one of two cases of recurring retinal hemorrhages, in which the attacks came on in multiples of seven days, the corpuscles of Laveran were found.

There are forms of rheumatic ocular disturbances that are made worse by a cold, moist climate. One case presented optic atrophy, with amblyopia that appeared to be a result of high altitude, recovery taking place near the sea-level. The treatment included the chlorides of iron, arsenic, mercury, and strychnine internally, and a weak collyrium of eserine to be used morning and evening.

Dr. T. J. Mays, Philadelphia, read a paper entitled "The Management of the Convalescent Stage of Phthisis," in which he dwelt upon the necessity for care in the management of the convalescent period of pulmonary tuberculosis. In the active stage, according to Dr. Mays, nothing is so potent for good as protracted rest, and nothing so harmful as ill-advised exercise. Next in importance to rest is nutritious food, such as freshly expressed beef-juice, beef-powder, beef, eggs, milk, oysters, etc., and drug-medication.

After the patient has been so far restored as to be able to go to work, he must avoid becoming tired and forego all physical strain ; he may become fatigued, if he is readily refreshed by rest and food ; but if he tires himself so that he is constantly exhausted, there must be excessive irritation somewhere, and the body is wasting its resources too rapidly. An abundance of rich, nutritious food should be taken. Pulmonary gymnastics should be practised, so that the lungs may be fully expanded. Deep voluntary breathing in the open air, with closed mouth, should be encouraged at intervals of an hour or two throughout the day, for ten or fifteen breaths in succession at a time. The hands may be brought above

the head during inspiration and gradually brought to the side in expiration. The breathing of compressed and rarefied air is the most powerful means at our command for increasing the respiratory capacity. Physical exercise within limitations is desirable during convalescence. One of the best forms is walking ; but care must be taken to avoid fatigue. The selection of a suitable occupation is of importance, and is often attended with difficulty. If the previous occupation has proved injurious it must not be resumed.

Dr. Smith pointed out that in the early stages it is necessary to determine whether a lesion of nutrition is the primary condition and the pulmonary lesion secondary, or the reverse. In the case of an individual who has been engaged in a sedentary occupation and the nutritive powers have become weak and there is depression, the gain from proper exercise in improving the nutrition would be greater than the loss that might result from conservation of vitality. If, on the other hand, the pulmonary difficulty has taken precedence, then the reasoning of Dr. Mays holds good, and the forces must be conserved.

Dr. Otis, of Boston, emphasized the fact that but few individuals leading ordinary lives breathe fully and properly.

Dr. A. C. Abbott, of Philadelphia, read a paper entitled "Considerations Concerning Asiatic Cholera."

Dr. E. O. Shakespeare, of Philadelphia, remarked upon "Public Quarantine Against Cholera." He emphasized the importance of placing quarantine under the uniform direction of the central government, and not submitting it to the whims or inefficiency, or lack of knowledge, or lack of backbone of local quarantine officers, who are especially liable to be influenced by the mercantile interests, to the detriment of the people behind the great ports.

He pointed out that this country is exposed to infection from cholera almost exclusively by the immigrant, and it is irrational for a country in which such a danger does not exist, as in England, to assume that the conditions are the same here as there.

Dr. A. N. Bell said he had listened with great interest to the paper of Dr. Abbott and the remarks of Dr. Shakespeare on the prevention of cholera by treating the evacuations,

when they are accessible, and by quarantine to prevent its introduction into the country; but during the while his mind had been more and more impressed with the thought that in the exercise of such efforts we are, after all, using the left arm only for defence, and very weakly at that, as compared with the greater strength of the right arm, to which Dr. Shakespeare alluded as the practice of England. While, he said in substance, I have much confidence in quarantine as now understood, there is reason to fear that the too exclusive attention to it in this country recently is more calculated to increase the danger of the introduction of cholera among us than to lessen it. Sanitary officers as well as the public generally have had their attention diverted from the right arm of defence—local and general sanitation—and have been led to consider port sanitation as their chief dependence instead of regarding it, as it is, a secondary means of defence. But we should not be misled by Dr. Shakespeare's reference to the thoroughness of local sanitation in England, as her only defence. While it is true that, on account of its excellence, her people are better protected than any other people in the world, she is not unmindful of some danger from importation, and she is ever vigilant against its introduction at her own ports, even to the extent of refusing entrance to vessels and merchandise suspected of being infected, while—for the promotion of her commerce—she will clear them onward to the United States or other foreign ports.

With regard to the New York Quarantine in particular, however, if the question were less serious, Dr. Shakespeare's remarks would be amusing. It is quite true that the quarantine establishment of New York, which was undertaken on scientific principles a little more than twenty years ago, is still unfinished; but all of us here know that substantial progress in sanitary measures, similar to progress in military measures, is chiefly made when the enemy threatens. The foundation, as it now obtains, was laid under the spur of a threatening epidemic. The epidemic retreated, and further State appropriations were refused. This has oocurred several times during the interval. At the present time rapid progress is being made, and possibly, but I hope not, it may be completed before the enemy again retreats. But why should Dr.

Shakespeare find so much fault with the intermittent efforts and incomplete defences of the Port of New York in view of the utter deficiencies of Philadelphia? Is Philadelphia in the admirable condition of London or other English ports? Is her right arm so strong for defence that she has no use for her left? It is sincerely to be wished that it were so, not with regard to Philadelphia only, but to every seaport and every city of the country; and quarantine would then give us less concern. But until that is so, until Congress can be made to realize that quarantine, whether national or otherwise, *is necessarily proportional with the neglect of local sanitation*, and by appropriate legislation relegates it to its proper place, by the establishment of a comprehensive health service adapted to the protection of the health of the millions of the people throughout the country, instead of merely posting sentinels at the gates—until that time comes we must continue to support the sentinels, but *don't neglect home sanitation.*

Dr. Judson Daland, of Philadelphia, read a paper on 'Recent Agencies Used in the Treatment of Cholera." In the way of prophylaxis, it is only necessary to prevent the swallowing of the cholera-organism. Ordinary water and uncooked or partially cooked vegetables, fruits, and salads are to be avoided. Boiled or distilled or bottled waters may be used. Scrupulous care as to personal cleanliness should be observed. Attacks of indigestion should be avoided, and all food taken should be easily digested and nourishing. If the hands have become infected with cholera-germs in any way, they may be sterilized by dipping in a 1 to 500 mercuric-chloride solution.

In the premonitory stage the patient should be kept in bed, and be protected from cold. The food should be of the simplest character, preferably boiled milk, boiled rice, milk-toast, in small quantities, at intervals of two hours. The administration of five grains of pepsine with the food is of benefit. As acids tend to destroy the cholera-bacilli, one of these should be administered, hydrochloric acid preferably, for an adult from thirty to forty drops in a tumbler of water. Aromatic sulphuric acid has been used with success.

In the evacuant stage, or stage of collapse, the best means for supplying the system with liquid is the subcutaneous injection of water containing from 6 to 10 per cent of sodium

chloride—two small teaspoonfuls to a quart of distilled hot water (110°), to which two ounces of brandy may be added. A small aspirating needle and canula, attached to the rubber tube of an ordinary fountain syringe, are all that is needed. The best point of introduction is in the flank between the ribs and the crest of the ilium. The apparatus should be sterilized, and all antiseptic precautions taken. The first injection in an adult should be two quarts. Intestinal disinfectants should be used. A 2 per-cent solution of tannic acid should be slowly introduced into the rectum, using a rubber tube one-quarter inch in diameter, having one outlet one-half inch from the extremity, and another on the opposite side two inches from the extremity; the terminal portion is closed and rounded. This should be oiled, warmed, and slowly introduced into the rectum by a slight rotary motion a distance of about ten inches. This tube should be connected with an ordinary fountain syringe. Heat may be supplied by means of the hot plunge-bath, repeated as often as desirable, and hot air may be conducted beneath the bed-clothing; hot-water bags, hot-sand bags, hot bricks may be used, or a water bed may be filled with hot water.

The best method of administering stimulants is by deep hypodermatic injection, which may be repeated as often as indicated.

As the stomach often contains choleraic liquid, it is advisable to thoroughly irrigate this viscus with hot tannic-acid solution. Peptonized milk, two ounces every two hours, may be used. If not well received, it may be surcharged with carbonic-acid gas, or koumyss may be substituted. Iced champagne or carbonated distilled water may be given.

If intense pain and muscular cramp be present, morphine, gr. $\frac{1}{6}$, atropine, gr. $\frac{1}{100}$, may be injected into the muscles.

In the stage of reaction, the quantity of liquid food and liquid may be increased; the hydrochloric acid should be continued. If suppression of urine persists, hypodermatoclysis may be continued at intervals of eight hours. To facilitate digestion, five grains of pepsine should be administered with the hydrochloric acid. In favorable, uncomplicated cases the amount of nourishment should be gradually increased, passing from liquid to more solid food, bread saturated with milk,

junket, poached white of egg, etc., and returning to ordinary food. If the typhoid state remains, hypodermatoclysis should be repeated once or twice daily; and strychnine, gr. $\frac{1}{40}$, and quinine, 3 grains, may be given every four hours, with hydrochloric acid and pepsine.

Dr. J. H. Musser, of Philadelphia, presented a communication entitled "Notes on Tuberculous Pleurisy." He pointed out that the diagnosis is based upon the prolonged impairment of health in a person usually past thirty, in conjunction with the physical signs of thickening of the pleura. The sputum is usually mucous or muco-purulent, and contains no tubercle-bacilli early. There is no advanced lung-destruction. Cough and dyspnœa are present out of proportion to the physical signs. Palpation and inspection, in addition to percussion and auscultation, are important means of diagnosis.

The prognosis is comparatively good; the patients usually recover, though they may never regain full strength and weight.

There is no specific treatment. Of importance are the general management, the diet, and remedies for the gastro-intestinal catarrh, together with proper respiratory gymnastics. During a certain period of the day it is well for the patient to stay in bed. Opium may be indicated in small, stimulating doses.

Dr. John W. Brannan, of New York, read a paper on "Phlegmonous Angina and its Treatment by Early Incision." He stated that until recently this condition was included in tonsilitis, although in four fifths of the cases the abscess forms outside of the gland.

Quinsy is not a rare disease, and is usually first seen by the family physician. A severe case is never a light matter to the patient, though the prognosis is usually favorable; in most cases pus forms, and the patient is miserable until this is evacuated. Some oppose instrumental interference, but it is the general practice to let out the pus as soon as its situation can be determined. This is followed by immediate relief. Scarification is of no benefit, and usually aggravates the condition.

In the great majority of cases the abscess opens in the soft palate. The puncture is made through the anterior pillar of the fauces, with good illumination. It is important to relieve

the tension of the parts, even if suppuration has not taken place. Unless there are signs of pointing elsewhere, the incision should be made through the soft palate directly backward. If ordinary surgical care is exercised there is no danger of wounding the internal carotid artery. In cases of deep-seated inflammation, in which the pus comes slowly to the surface, erosion of the arteries in the neighborhood may take place ; and the surgeon must be prepared to deal with arterial hemorrhage at the moment the abscess discharges into the pharynx.

Dr. Carl von Ruck, of Asheville, read a paper entitled " A Contribution to the Results of Treatment of Pulmonary Tuberculosis by Professor Koch's Method." He detailed the further progress of twenty-five cases of pulmonary tuberculosis treated with tuberculin, and reported two years previously. In the five cases treated in the early stage recovery has taken place and no relapse has occurred.

Of seven more advanced cases final recovery took place in six ; relapse in one, followed, however, by improvement.

Of thirteen far-advanced cases, death took place in seven ; six are still alive, three continuing greatly improved, and three others remain improved.

It is not possible to mathematically demonstrate the share attributable to the treatment with tuberculin, but it must be admitted that these results are better than have been obtained by any other mode or combination of treatment.

The proper selection of cases is important. No patient is suitable for treatment with tuberculin who presents symptoms of acute inflammatory changes in the tuberculous areas or of septic infection. The treatment should be carried out in a special institution, where alone control and oversight are possible. Physical examination of the chest must precede and follow the administration of every dose, and the result be recorded. The distinction between local and general reaction must be clearly understood. The latter is to be avoided. The dose should not be repeated for twenty-four hours after the effects of the previous dose have subsided.

The initial dose may be $\frac{1}{20}$ milligram, and may be gradually increased by tenths of a milligram up to 1 milligram. Then the increase is by fifths up to 2 milligrams ; then by halves

up to 10 ; by doses of 2½ up to 20 ; and thereafter by doses of 5 milligrams at a time. When a point is reached where the improvement is radical the remedy is withdrawn for from two weeks to a month. If there is no relapse the patient is simply kept under observation, but if there is a relapse a repetition of the treatment is necessary.

Tuberculin must not be considered a cure-all, or as a remedy indicated under all conditions of the disease, but as of great value when used properly. Its effects are as uniform as could be expected under the great variety of individual conditions present, such as constitution, stage of the disease, organs involved, and complications.

Dr. I. H. Hance, of Saranac Lake, N. Y., read a paper entitled " A Clinical Study of Crude Tuberculin and Modifications of the Lymph in the Adirondack Cottage Sanitarium." He reported twelve cases treated with Trudeau's modification of tuberculin. In all, the sputum contained tubercle-bacilli. In four of the cases the process was incipient ; in five, advanced ; and in three, far advanced. Three of the incipient cases were cured, and no relapse has occurred now after eighteen months. One has returned to the Sanitarium, but the process is confined to one lung, and has assumed a more limited character than usual.

Of the advanced cases one is well (discharged eight months ago), as are three other cases discharged at later periods ; the fifth has been lost sight of.

Of the far-advanced cases two were hopeless and are dead, and the third left the Sanitarium with the disease quiescent, but was suffering from gastric catarrh. Since she has developed diarrhœa, and is probably dead. In all of these far-advanced cases throat-lesions were most pronounced.

It is the aim to administer the lymph so that it will not produce any reaction, as any systemic disturbance is productive of injury. Beginning with small doses, given sometimes twice a day, until tolerance has been established (which may be a matter of some weeks), it has been found that patients with very far-advanced lesions bear the lymph well.

The initial dose is from 0.001 to 0.005, and is repeated daily unless the patient reacts, as evidenced by a rise of temperature to over 100° F. in apyretic cases, or above the daily

average temperature in febrile cases, or by marked systemic disturbance. In any of these events the injections are omitted for a day or two, and the dose is more slowly and cautiously increased by from 0.002 to 0.005 at a time until 0.025 or 0.050 are administered. When this dose has been administered without any reaction for a couple of weeks tolerance has been established, and the injections can be given in more rapidly increasing doses. The largest dose ever administered daily without reaction was 1.8 c.c. When the lymph has been omitted for some time, subsequent treatment shows that the system is more tolerant than upon first treatment.

Dr. A. H. Smith, of New York, read a paper on "Respiratory Mechanism of Wounds in the Chest." He exhibited a mechanical device for illustrating the movements of the lung in penetrating wounds of the chest. It consisted of two bellows, operated by handles common to both, and representing the thoracic cavities, each containing an elastic bag, representing the lung. The top of each bellows was of glass. A slot, covered by a slide, represented a wound of variable dimensions, tubes representing the bronchi and trachea connecting the two bags.

With the slot wide open, and the bag on that side disconnected from its fellow, it was seen that the movements of the bellows were without effect on the bag; but when the connection was re-established, it was evident that the bag received air from its bellows when the handle was depressed and that it collapsed when the handle was lifted, its movements being exactly the reverse of those of the bag on the other side. When the device representing the glottis was partly closed, this reverse movement was very marked. Dr. Smith observed that this action exactly resembled that seen in an animal when the thorax on one side is freely opened. On progressively lessening the size of the opening this reverse action becomes constantly less, until a point is reached where the lung (bag) remains at rest in a state of partial inflation. With a still smaller opening, the lung begins to follow the movements of the chest and becomes independent of the action of its fellow.

Dr. Smith exhibited a valvular drainage tube for cases of operation for empyema. The valve consists simply of an

india-rubber nipple with a slit in the top; this nipple is secured to the outer extermity of the ordinary tube, and forms a complete valve.

Dr. A. N. Bell, of Brooklyn, read a paper on "The Climate and Mineral Springs of North Carolina," an abstract of which was published in our June number.

Dr. Darlington expressed his belief that the matter of climate does not have a great deal to do with disease—certainly not with pulmonary tuberculosis. Oregon, with its great rainfall, is more healthful than the drier sections, such as California, New Mexico, and Arizona, where there is very much less rainfall. One can find as many rosy cheeks in London, where there is no sunshine, as on the Western plains, where the sun shines every day. Persons who go great distances from home for their health are often exposed to many annoyances, anxieties, and discomforts.

The subject was still further discussed by several members, for the most part advocating the advantages of high altitudes. In concluding the discussion, Dr. Bell emphasized the scope of his paper—to describe conditions without expressing any preference for localities. His views in this regard, however, he thought were well known to the Association by his previous papers on pine forests and the ocean atmosphere, particularly his paper before the Association in 1889 on the "Influence of an Ocean Atmosphere on a Staid Population, with Special Reference to Pulmonary Consumption," as affecting the inhabitants of Turck's Island, almost at the level of the sea, among whom the ratio of deaths from pulmonary consumption was smaller than that of any similar population of which he had knowledge, exclusive of similar conditions. But the *chief* attribute of an ocean atmosphere was, in his judgment, its *cleanness*—an attribute which applied to other environments proportionally as they comprised it, wholly regardless of altitude.

Referring to the influence of damp soil as being promotive of pulmonary diseases, it was no more so, he thought, than of other diseases. "It is," he said, "the *dirty* soil moisture that makes people sick, and not the moisture *per se*." In verification of this he referred to observations where persons who were obliged to camp out on a dirty soil in a tropical

climate were protected by sleeping on leather sheets under fluffy mosquito bars.

The salubrity of pine forests he had described in a paper read before the Association on Southern Pines seven years ago; it is due to the natural drainage of the soil. All observers know that pine thickets are of very thrifty growth, and at the outset generally dense. The central or tap-root of the pine penetrates the earth perpendicularly, and sends out radicals all around. By the end of the third or fourth year they begin to thin out by the death of the weaklings, by which time the tap-roots have penetrated to the depth of about eighteen inches, and the radicals form an interlacing network of the soil. These sappy roots decay with wonderful rapidity, and leave in their places an inimitable network of soil drains.

The extraordinary mortality of negroes, and particularly of mulattoes, from consumption, which had been referred to, he attributed to their poor food, filthy habits, and stifling sleeping-rooms. "Never shall I forget," he said, "that more than fifty years ago, when I was a medical student in this city, the late Dr. John Neill took me to certain lodging-rooms in Philadelphia, where there were boarders at twenty-five cents a week on food that was collected by beggars from door to door, and where I observed the filthy straw upon which the scrofulous and consumptive creatures slept. I had learned something about the habits of negroes, if neglected, at my native home, but had never before seen such dens of disease. And here a word may be said with reference to the relation of consumption to bedrooms generally—even among the cleanliest of people—which there is reason to fear have recently been overshadowed by too exclusive attention to the great discovery of Koch. I say this with utmost deference to the genius of that great bacteriologist, but as a preventive measure it appears to me to stand in pretty much the same relation as quarantine does to local sanitation. It has distracted attention from bedroom sanitation and local conditions, and stimulated the effort of drowning men to catch at straws. Many invalids and some doctors have been led to think so much of the specific cure-all that the need of well-aerated bedrooms, wholesome food, and well-regulated exercise have been relegated into the background."

Dr. Edward O. Otis, of Boston, read a paper entitled "Measurements of the Chest and Lung Capacity." A comparison of these averages with those of other examiners shows but little difference.

Dr. J. R. Taylor, of Sag Harbor, N. Y., read a paper entitled "The Filaria Sanguinis Hominis, and Carcinoma of the Heart and Lungs Secondary to Carcinoma of the Liver."

Dr. A. L. Loomis, of New York, read a paper on "Cardiac Dyspnœa." He spoke of the different varieties of dyspnœa, and restricted the term cardiac dyspnœa to such changes in the heart as interfere with the passage of blood to the lungs. In this condition there are no changes in the lungs, bronchial tubes, or larynx to obstruct the entrance of air into the alveoli. It is because the condition is more commonly the result of obscure changes in the cardiac walls rather than of valvular lesions that its importance is to be emphasized.

Two cases were related in which death had occurred during the dyspnœic attacks. In one dilatation of the right heart, with fatty degeneration of its walls, was found, in consequence of which large masses of fibrin formed in the auriculoventicular opening, obstructing the passage of blood. In the other case the heart-cavities were found distended with blood, showing that the heart had stopped in diastole. Both coronary arteries were completely obstructed. In one of the arteries the obstruction had evidently existed a long time, but though the calibre of the other was diminished for an inch or more, it had been pervious until a short time before death, as evidenced by a recent thrombus. On microscopic examination the cardiac walls were found to have undergone fibroid changes.

Dr. Loomis considered the different pathologic conditions that would give rise to cardiac dyspnœa, and the causes of death.

It seems reasonable to suppose that in all cases the predisposing cause of true cardiac dyspnœa is a gradual failure in the contractile power of the heart, and that the exciting cause is an arrest of the cardiac circulation.

A fully developed attack usually comes on with a sense of constriction across the chest, which is immediately followed by a gasping for breath; the surface of the body becomes

pale and cold ; the countenance extremely anxious, and if the attack is not too severe, the patient is constantly changing his position with the hope of obtaining relief. The mind remains clear ; the pulse is feeble, irregular, and intermittent, and frequently there will be a prolonged absence of the radial pulse.

The following were elected officers for the ensuing year : President, Dr. Andrew H. Smith, New York ; Vice-Presidents, Dr. E. L. Trudeau, Saranac Lake, N. Y., and Dr. I. H. Platt, Lakewood, N. J.; Secretary and Treasurer, Dr. J. B. Walker, Philadelphia ; Council, Dr. E. L. Shurley, Detroit ; Dr. A. L. Loomis, New York ; Dr. F. I. Knight, Boston ; Dr. R. G. Curtin, Philadelphia, and Dr. W. E. Ford, Utica, N. Y.

THE HOMŒOPATHIC HEN.—1. A hen six years old, laying three to four eggs a week, began to lay eggs without the hard shell, and ate them. A dose of *Calc. carb.* 9c. would not remedy the evil in a week. But after another dose of *Calc. carb.* cm. the hen laid a hard-shell egg the second day, and continued so ever since.

2. When the hens get the chicken cholera, about ten pellets of *Veratrum alb.* 9c. are dropped in their drink-water (three quarts) and in a few hours they are all right again.

3. The hen, sub 1, was at one time so constipated that we feared to lose her with her fruitless exertions. A dose of *Nux vom.* 9c. relieved her within an hour.

4. A silver-spangled Hamburg got frightened and ran around in a narrow circle. A dose of *Bellad.* 8c. restored her before an hour was passed, and she continued well, and was a capital layer for four years more.

5. Hens with croup have frequently been saved by a dose of *Spong. tosta.* 9., often in an incredibly short time. The dose was given in this way : The hen was captured, and held by another person, the bill was opened with the left hand, and with the right hand a few pellets were poured from the bottle down the throat.—*B. Fincke, M.D., I.H.A. Trans.—Denver Medical Times.*

TOPOGRAPHY, CLIMATE, AND MINERAL SPRINGS OF VIRGINIA.

By A. N. Bell, A.M., M.D.

Virginia lies in latitude 36° 33′ to 39° 27′ north, corresponding to Southern Europe, Central Asia, Southern Japan, and California. Its longitude is from 75° 13′ to 80° 37′ west from Greenwich. On the south it adjoins North Carolina for 326 miles and Tennessee for 114 miles, making the line of the State from the Atlantic west 440 miles; on the west and northwest Kentucky for 115 and West Virginia (by a very irregular line) for 450 miles, form the boundary. Maryland is northeast and north, separated by the Potomac River and the Chesapeake Bay for 205 miles from Virginia, and by a line of 25 miles across the Eastern Shore. East and southeast it is bordered by the Atlantic for 125 miles. The boundary lines of the State measure about 1400 miles. On the northwest they are mostly mountain ranges, on the northeast and east water. The longest line in the State, from the Atlantic southwest to Kentucky, is 476 miles; the longest from north to south is 192 miles.

The State has an area of land surface of 40,125 square miles, and a water surface estimated at 2325 square miles.

There are six great natural divisions or belts of country extending across the State from northeast to southwest, as a general direction, nearly parallel to each other, and corresponding to the trend of the Atlantic coast on the east, and of the ranges of the Appalachian system of mountains on the northwest. These grand divisions are, taken in the order of succession from the ocean northwest across the State: 1st. The Tidewater Country; 2d. Middle Virginia; 3. The Piedmont Section; 4th. The Blue Ridge Country; 5th. The Great Valley of Virginia; 6th. The Appalachian Country. These divisions not only succeed each other geographically, but they occupy different levels above the sea, rising westwardly like a grand stairway, with differences of climate, soil, productions, etc.

The Tidewater region includes the alluvial and diluvial plain

of sand in the eastern portion of the State, divided primarily by Chesapeake Bay and secondarily on the Western Shore into nine principal peninsulas by great rivers, and these are subdivided into a great number of smaller ones, giving a wealth of outline not even surpassed by the famous Morea of Greece ; in truth, there are here dozens of Moreas. These peninsulas are, politically, each divided into counties (thirty in all), most of them laid out and named when this, the first settled portion of English-speaking America, was a British colony, and the names given them were those of the counties or worthies of England, the " Mother Country" at the time.

The first peninsula is the Eastern Shore, extending to the south between Chesapeake Bay and the Atlantic, divided between the large counties of Accomack and Northampton.

The second, taking them from the north to the south, is the Northern Neck, 75 miles long and from 6 to 20 wide, extending southeast from the Middle Country to the bay, between the Potomac and Rappahannock. Its counties are King George, Westmoreland, Richmond, Northumberland, and Lancaster. This peninsula is almost surrounded by navigable waters.

The third, or Middlesex Peninsula, extends southeast for 60 miles, with a breadth of from 3 to 10, between the Rappahannock and the Piankitank rivers, including Essex and Middlesex counties. The Rappahannock is navigable all along one side, and the Piankitank nearly half of the other. This is one of the short peninsulas succeeding a long one.

The fourth, or Gloucester Peninsula, reaches southeast from the Middle Country, between the Piankitank and the York and its extension, the Mattapony, some 70 miles to the bay, where it is " forked" by the Mobjack Bay. Its width is from 6 to 18 miles. It includes King and Queen, Mathews and Gloucester counties.

The fifth, the King William or Pamunkey Peninsula, a short one, extends 60 miles southeast, between the Mattapony and the Pamunkey (the streams that form the York). This is from 3 to 14 miles wide, and includes the counties of Caroline and King William, although the former extends across the neck of the third peninsula to the Rappahannock.

The sixth, a long one, is known as " The Peninsula," by

way of eminence, as it was the first settled ; and Williamsburg, its chief town, was the colonial capital of Virginia. This stretches 100 miles to the southeast, with a width of from 5 to 15 miles, between the Pamunkey and its extension, the York, on the north, and the Chickahominy and the continuing James on the south. This large peninsula extends from the Middle Country to the bay, and looks out between "The Capes." Its counties are Hanover, New Kent, James City, York, Warwick, and Elizabeth City.

The seventh, the short, Richmond or Chickahominy Peninsula, between the Chickahominy and the James, is 50 miles long and from 5 to 15 wide, divided into Henrico and Charles City counties. The former contains Richmond, the capital of Virginia.

The eighth, or Southside Peninsula, embraces all the country south of the James, and between it and the Nansemond River and the North Carolina line. This is the last peninsula trending to the southeast, which it does for 64 miles, with a width of from 35 to 40. Its counties are Prince George, Surry, Sussex, Southampton, Isle of Wight, and Nansemond.

The ninth is the Norfolk Peninsula, including the counties of Norfolk and Princess Anne—the territory between the Nansemond River, Hampton Road, Chesapeake Bay, and the Atlantic—some 30 by 35 miles in extent, protruding northward.

The average width of this tidewater plain, extending from the seacoast to Richmond, is nearly one hundred miles, and its greatest elevation not more than one hundred and fifty feet above the level of the sea. A considerable portion of it is marshy and insalubrious, giving rise to intermittent and remittent-fevers during early autumn and predisposing to pneumonia and rheumatism during the winter.

It is surprising to note the approximate accuracy with which the climate of this region was described by John Smith, nearly three centuries ago, in his first report, 1607 :

" The temperature of this Country doth agree well with the *English* constitutions, being once seasoned to the Country. Which appeared by this, that though by many occasions our people fell sicke ; yet did they recover by very small meanes, and continued in health, though there were other great causes not only to have made them sicke, but even to end their dayes, etc.

"The Sommer is hot as in *Spaine;* the Winter cold as in *France* or *England.* The heat of sommer is in Iune, Iuly and August, but commonly the cool Breezes assuage the vehemency of the heat. The chiefe of winter is halfe December, Ianuary, February, and half March. The cold is extreme sharpe, but here the Proverbe is true, that *no extreame* long continueth. . . .

"The winds here are variable, but the like thunder and lightening to purify the ayre, I have seldom heard or seen in *Europe.* From the Southwest came the greatest gusts with thunder and heat. The Northwest winde is commonly cool and bringeth fair weather with it. From the North is the greatest cold, and from the East and Southeast, as from the *Barmudas*, fogs and raines.

"Sometimes there are great droughts, other times much raine, yet great necessitie of neither, by reason we see not but that all the varitie of needful fruites in *Europe* may be there in great plentie, by the industry of men, as appeareth by those we there planted."

Such is the earliest record of the climate of Virginia, 1607, in the tidewater region, on both sides of Chesapeake Bay. The shores extending to the Capes consist now, as they did then, of "white hilly sands like unto the Downes, and all along great plentie of Pines and Firres."*

The colonists first landed at what is now known as Hampton, and—in virtue of their relief from the storms which had driven them hither from off the disastrous Roanoke settlement—they named their landing place "Point Comfort," which by the lapse of time became *Old* Point Comfort, long and well known as one of the most salutary seacoast sanitary resorts in the country.

The storm having abated, the colonists again took to their ships and sailed up the magnificent Powhatan River—now the James—and on May 13th, 1607, landed on a low peninsula, where they built Jamestown. The site is now an island that has almost disappeared; but here may still be seen the ivy-clad tower of the church they built, and the graveyard still shows some cracked slabs and tombstones, on which some of

* Smith's "History of Virginia." Richmond edition, 1819. (From London edition of 1629.) Vol. i., pp. 113, 114.

the names may yet be deciphered, among them that of the wife of Commissary Blair, the founder of William and Mary College at Williamsburg. It is a noteworthy fact that one of the first cares was the providing of a place for religious worship. An old tent was the first church; but when Lord Delaware came out in 1610 he found at Jamestown a substantial church, the ruins of which are among the most interesting relics of that early time.

Middle Virginia comprises the triangular tract that extends from a northerly and southerly line running through Richmond to the foot-hills of Southwest Mountain, a wide and undulating plain of no great elevation, but with an average of about four hundred feet above the level of the sea.

This region is very thoroughly drained by the many deep rivers which take their rise in the higher altitudes and run through it. It is consequently almost wholly devoid of malarial diseases, and is generally salubrious.

PIEDMONT VIRGINIA is the long belt of country stretching for 244 miles from the banks of the Potomac and the Maryland line southwest, along the eastern base of the Blue Ridge Mountains, and between them and the Coast Range, to the banks of the Dan at the North Carolina line; it varies in width from 20 to 30 miles, averaging about 25; its approximate area is 6680 square miles.

Its latitude corresponds with that of the State, 36° 33′ to 39° 27′ north; its longitude is from 77° 20′ to 80° 50′ west.

This Piedmont Country is the fifth step of the great stairway ascending to the west; its eastern edge, along Middle Virginia, is from 300 to 500 feet above the sea; then come the broken ranges of the Coast Mountains, rising as detached or connected knobs, in lines or groups, from 100 to 600 feet higher. These are succeeded by the numberless valleys, of all imaginable forms, some long, straight, and wide; others narrow and widening; others again oval and almost enclosed, locally known as "Coves," that extend across to and far into the Blue Ridge, the spurs of which often reach out southwardly for miles, ramifying in all directions. Portions of Piedmont form widely extended plains. The land west of the coast ranges is generally from 300 to 500 feet above the sea, and rises to the west, until at the foot of the Blue Ridge it attains an elevation of from 600 to 1200 feet. The Blue Ridge

rises to from 2000 to 4000 feet above the sea ; at one point near the Tennessee line, it reaches a height of 5530 feet ; its general elevation is about 2500, but its outline is very irregular.

Numerous streams have their origin in the heads of the gorges of the Blue Ridge, and most of them then flow across Piedmont to the southeast until near its eastern border, where they unite and form one that runs for a considerable distance along and parallel to the Coast Mountain, and takes the name of some of the well-known rivers that cross Middle and even Tidewater Virginia, like the Roanoke or Staunton, and the James. Some of these rivers break through the Blue Ridge from the Valley, making water gaps in that formidable mountain barrier, as the Potomac, the James, and the Roanoke ; but they all follow the rule above given in their way across this section.

This is a genuine "Piedmont" Country—one in which the mountains present themselves in their grand as well as in their diminutive forms—gradually sinking down into the plains, giving great diversity and picturesqueness to the landscape, with its wealth of forms of relief as varied by those of outline in Tidewater. Few countries surpass this in beauty of scenery and choice of prospect, so it has always been a favorite section with men of refinement in which to fix their homes.

The BLUE RIDGE SECTION, for two thirds of its length of 310 miles, is embraced in the Valley and Piedmont counties that have their common lines upon its watershed ; it is only the southwestern portion of it, where it expands into a plateau, with an area of some 1230 square miles, that forms a separate political division ; still the whole range and its numerous spurs, parallel ridges, detached knobs and foot-hills, varying in width from 3 to 20 miles, embracing nearly 2500 square miles of territory, is a distinct region, not only in appearance but in all essential particulars. The river, in the gorge where the Potomac breaks through the Blue Ridge, is 242 feet above tide. The Blue Ridge there attains an elevation of 1460 feet. Mt. Marshall, near and south of Front Royal, is 3369 feet high ; the notch, Rockfish Gap, at the Chesapeake & Ohio Railroad, is 1996 feet, and James River, where it passes through the Ridge, is 706 feet above tide, or more than twice as high as the Potomac at its passage. The Peaks of Otter, in Bedford County, are 3993 feet, and the Balsam Mountain, in Grayson, is 5700 feet, and in North Carolina this range is

nearly 7000 feet above the sea level. These figures show that this range increases in elevation as we go southwest, and every portion of the country near rises in the same manner. At a little distance this range is generally of a deep blue color. The whole mountain range may be characterized as a series of swelling domes, connected by long ridges meeting between the high points in gaps or notches, and sending out long spurs in all directions from the general range, but more especially on the eastern side, these in turn sending out other spurs, giving a great development of surface and variety of exposure.

The GREAT VALLEY OF VIRGINIA is the belt of limestone land west of the Blue Ridge, and between it and the numerous interrupted ranges of mountains, with various local names, that run parallel to it on the west at an average distance of some twenty miles, that collectively are called the Kittatinny or North Mountains. This valley extends in West Virginia and Virginia for more than 330 miles from the Potomac to the Tennessee line, and 305 miles of this splendid country are within the limits of Virginia. The county lines generally extend from the top of the Blue Ridge to the top of the second or third mountain range beyond the Valley proper, so that the political Valley is somewhat larger than the natural one, which has an area of about 6000 square miles, while the former has 7550, and a population of twenty-six to the square mile. The latitude of the Valley is from 36° 35′ N. to 39° 26′; its longitude is from 77° 50′ to 80° 16′ W.

While this is one continuous valley, clearly defined by its bounding mountains, it is not the valley of one river, or of one system of rivers, but of five; so that it has four watersheds and four river troughs in its length, along the Valley from the Potomac to the Tennessee line. These valleys and their length in the Great Valley are, from the northeast—

1st.	The Shenandoah Valley.....	136 miles.
2d.	The James River Valley.....	50 "
3d.	The Roanoke River Valley.....	38 "
4th.	The Kanawha or New River Valley.....	53 "
5th.	The Valley of the Holston or Tennessee.	52 "
		330 miles.

(*To be continued.*)

MEDICAL EXCERPT.

By T. P. Corbally, A.M., M.D.

Hydrogen Peroxide in Contagious Diseases. Dr. Cyrus Edson, Health Commissioner of New York, writes that (*The Doctor of Hygiene*, New York, April, 1893) in the treatment of diphtheria and scarlatina angina, hydrogen peroxide has no equal, that its efficacy cannot be questioned. We have in $H_2 O_2$ a powerful antiseptic agent, which may be administered without harm to the human system, and by means of which the alimentary canal can be more thoroughly disinfected than by any other agent in our present range of therapeutics. In other words, there is no other antiseptic that will effect the amount of germ destruction in the alimentary canal without inflicting injury. This is true for two reasons :

First, hydrogen peroxide has no toxic properties, and consequently may be administered in larger amounts than can the toxic antiseptics.

Second, hydrogen peroxide ranks higher as a bactericide than does any other non-toxic agent, and indeed than do most of the toxic ones.

The elaborate reports made by such men as Paul Bert and Regniard, Baldy, Gibier, Pean and Larrive prove these two facts as conclusively as they can be proven.

It logically follows that we have in hydrogen peroxide a curative agent, from the use of which we may expect good results in cases of disease arising from germ infection of the stomach and bowels.

In this connection, one fact must be borne in mind : peroxide of hydrogen decomposes rapidly in the presence of organic compounds. We must consequently administer the drug rather freely in order to produce the best effects, and on this account also free irrigation of the lower intestines, as devised and recommended by Dr. Elmer Lee, of Chicago (*Medical Record*, December 17th, 1892), is adapted to effect the greatest good.

The paper by Dr. Lee, to which I have just referred, details the results of his experiments in the treatment of Asiatic

cholera at St. Petersburg last year, and advocates the intestinal irrigation for the cure of the disease.

It is impossible to read this able article and not be convinced that the methods advanced are in the highest degree scientific and logical.

The intestinal irrigation is accomplished by means of a soft rubber tube, one metre in length and of suitable size to be introduced into the rectum, in front of the promontory of the sacrum, into and up through the sigmoid flexure and into the descending colon. This tube, which is connected with a reservoir, should not be too small nor too large, in order to facilitate its introduction through the folds of the sigmoid portion of the lower bowel.

In fact, the greatest difficulty to be encountered is to successfully pass the tube in front of the promontory of the sacrum, and enter it into the sigmoid flexure. The tube should be of proper firmness to prevent it from bending or buckling upon itself when the end (which in all cases should be rounded) comes in contact with the obstructing folds of the intestine.

Dr. Lee reports very satisfactory results from a thorough irrigation of the intestines with warm water containing a small proportion of liquid soap made of vegetable oil, potash, and glycerine, in connection with peroxide of hydrogen (medicinal) as an internal treatment.

By following Dr. Lee's system of irrigation of the intestinal canal, with a large amount of the above solution (two or three gallons), the whole amount of infected matter which is present in the intestinal canal is mechanically carried away; after which, by a second thorough irrigation of the intestinal tract with one or two gallons of warm water containing 4 per cent of peroxide of hydrogen (medicinal), any comma-bacilli which may remain in the intestinal tract will be readily destroyed.

In addition to irrigation or washing out of the intestines, Dr. Lee administers internally peroxide of hydrogen, two ounces diluted with eight ounces of distilled water, in cupful doses every two hours. The addition of distilled water is made in order to increase the bulk of fluid in the stomach.

It is my opinion that this treatment will prove to be "par excellence," the treatment for cholera nostras, dysentery, typhus and typhoid-fever.

In the latter disease hydrogen peroxide has already been tried with beneficial results, administered by the mouth.

For yellow-fever, hydrogen peroxide must be considered a specific. Gibier has shown that this disease is due to micro-organisms that infect the intestines, and basing treatment upon this fact, solutions of mercuric bichloride have been advocated for intestinal irrigation, and large doses of the drug have been exhibited with good results.

But H_2O_2 is a far safer and much more efficacious remedy. It has been demonstrated that the germicidal power of a solution containing two ounces of H_2O_2 (medicinal) to a pint of water is equivalent to a 1½ per cent solution of bichloride of mercury. But it is evident that we cannot use the latter without killing the patient, while the former solution is harmless.

In the treatment of yellow-fever peroxide of hydrogen should be injected into the rectum in the proportion just described three times daily, the water being warm.

Distilled or boiled water should always be used to effect the dilution of hydrogen peroxide, for the reason that water containing organic matter slightly weakens the strength of the peroxide, a certain amount of the agent being decomposed.

This brings to mind another :

Hydrogen peroxide is a safe and certain water purifier. When added to the contaminated water, it instantly destroys any micro-organisms that the beverage may contain. The proportion necessary to effect this is 3 per cent.

I have used a solution of H_2O_2 for washing out the stomach through the syphon tube (lavage) in cases of gastric catarrh with most excellent results.

The therapeutic range of hydrogen peroxide is daily enlarging ; a comparatively new remedy, it has already won for itself a place in the foremost ranks of our really valuable medicinal agents.

The advance of medical science is necessarily slow, because it must follow in the wake of the development of allied sciences, upon which it depends for its resources.

Chemistry has only recently given us hydrogen peroxide in its pure form, and to the efforts of Charles Marchand, of New York, more than to any other man, do we owe this invaluable

remedy. A host of imitators have deluged the market with substitutes for his hydrogen peroxide. I have found his preparation *facile princeps*.

'SALOPHEN AS AN ANTIRHEUMATIC.—When the preparations of salicylic acid were first in medical practice, it was thought a specific had been discovered for the treatment of rheumatism. As time passed, it was found that the salicylates failed to meet all the requirements of an antirheumatic ; they frequently caused disturbance of the stomach, nervous disorders, irritation of the kidneys, and weakness of the heart. Accordingly, when salol, the phenol-ether of salicylic acid, was brought forward by Sahli as a substitute devoid of these disagreeable effects, it met with ready acceptance by the profession, but it was soon found that owing to the quantity of carbolic acid in its composition salol gave rise to carbolic acid poisoning in some cases if employed in larger doses. To obviate these toxic effects, a new body was constructed, in which the phenol element of salol is replaced by an innocuous substance, and to this resulting compound the name salophen has been applied. Although only recently introduced, salophen has already demonstrated its value as an antirheumatic in many hands. Dr. W. H. Flint (*New York Medical Journal*, July 30th, 1892) has employed the remedy in six cases of acute articular rheumatism, and concludes that we possess in salophen a remedy equal to the other salicylates to control the symptoms of acute rheumatic arthritis, but devoid of their tendency to weaken the heart's action, to disturb the stomach, and to produce albuminuria and smoky urine. Professor Hobart A. Hare, of Philadelphia (*Therapeutic Gazette*, January, 1893), speaks very favorably of the action of salophen in cases of severe neuralgia and myalgia of rheumatic origin, and considers the drug an important addition to the materia medica. Professor Guttmann, of Berlin (*Berlin. Klin. Woch.*), has employed it in cases of acute articular rheumatism, and found that it exerted very beneficial effects, especially in recent cases, the pains and swelling of the joint being rapidly relieved. Dr. Frolich (*Wien. Med. Wochenschr.*, July, 1892) states that the remedy did not fail in one out of thirty cases of acute rheumatism, and prefers salophen to the salicylates,

because (1) being decomposed in the intestine it does not irritate the stomach ; (2) it can be given in large doses and for a long period without unpleasant effects ; (3) it is tasteles . Dr. Edmund Koch (Inaugural Dissertation) has recently reported a large number of cases of acute rheumatism treated with salophen, and comments upon the rapidity with which it removed the pains, fever, and swelling. In various nervous affections, headache, migraine, sciatica it proved very efficient, rapidly removing or at least relieving the pains, and this without disagreeable after effect. These remarkable analgesic properties of salophen are also confirmed by Dr. Caminer (*Therap. Monatshefte*, October, 1892), who obtained excellent results from its use in cephalalgia, hemicrania, trigeminal neuralgia and sciatica.

Quinine as an Application to Wounds.—In *Nouveaux remèdes* for April 8th there is mentioned an article by Dr. Alföldi, published in the *Pester medicinisch-chirurgische Presse*, and summarized in the February number of the *Therapeutische Monatshefte*, who is convinced that a 1 per cent solution of quinine sulphate is a more rapid detergent and cicatrizant in cases of infected wounds than either corrosive sublimate or iodoform. He adds that wounds that are free from infection also heal with astonishing rapidity under the use of quinine applications.

Deaths under Anæsthetics.—Gurlt reported to the last Surgical Congress at Berlin the following statistics of deaths under anæsthetics. They are made up from the observations of 62 operators, who anæsthetized 109,196 persons, with 39 fatal results, showing 1 death to 2800 narcoses. The following were the anæsthetics used :

Chloroform	94,123	narcoses,	36 deaths.
Ether	9,431	"	no deaths.
Ether and chloroform	2,891	"	1 death.
Ether and alcohol	1,381	"	no deaths.
Bromoform with ethyl bromide	2,131	"	1 death.
Penthal	210	"	1 death.

In 2913 cases the narcosis lasted over an hour ; in an oper-

ation for utero-vaginal fistula, four and one half hours ; in a case of tetanus, nine hours. In 25 cases, of which post-mortem examinations were made, cardiac diseases were found. The author urges careful examination of the heart before administering chloroform.—*Cond. Extracts.*

URETHRITIS OF VELOCIPEDISTS.—M. Millée has presented a report to the Société de Médecine et de Chirurgie Pratiques, at its session, held February 16th last, of a number of observations which he had made on the urethritis in velocipedists. As the inflammation followed closely on the exciting cause, it could not be attributed to any other source.

Among the numerous cases which he has thus studied, the author presents eight very interesting ones, as reported in the *Progrès Médicale.* In every one of these the most scrupulous inquiry caused him to reject the possibility of blennorrhagic origin. Besides, in the greater number of the patients there had been, on many occasions, attacks of irritation in the urethra and the prostate, accompanied with difficult micturition, before it was possible to determine a well-defined case of suppurating urethritis. That is a condition which ought, it seems, to arrest the attention of physicians, for heretofore it has seemed impossible to bring any satisfactory observations to bear on cases in which the cause of the urethritis was purely traumatic. There is, no doubt, room for the discussion of the question ; almost all the patients had had previous attacks of blennorrhagia ; but in every instance the periods were very remote, so that the want of care in exposing the perineum to unusual irritation on the saddle of the bicycle must really be accepted as the cause of the disease.

M. Léon Petit : "I cannot accept the term 'urethritis of velocipedists.' Indeed, the greater number of the cases of M. Millée were persons who should have used the greatest care in selecting their instrument. However, I do not deny the fact itself, but I think that urethritis will be found only in cases in which the patient was badly mounted, or in novices in whom abnormal friction is produced by the unusual efforts they are obliged to make. Any one well trained will not experience such accidents, and, for this reason, prejudice against this sport should not be unjustly aroused, since it has come

into very general use, and is capable of rendering valuable service in many ways."

M. Moreau : "There is another cause which deserves consideration : all who make long journeys on velocipedes are liable to become greatly heated, are thirsty, and generally drink much on the road. I share fully the opinion of M. Léon Petit ; it is only the novices who have bad instruments who are likely to have inflammation of the urethra or of the prostate ; but the term 'blennorrhagic' should not be introduced in considering this question, for its bacteriological analysis has not yet been determined."

M. Léon Petit : "I insist strongly on the fact that fatigue alone should not be taken into account as a cause of urethritis ; there must be friction caused by a bad instrument."

M. Ménière : "I am not so positive as M. Petit. I have found such irritation even in people very well mounted, and having all the skill of an experienced bicyclist ; but these persons were of a certain age. They presented, in dismounting from their machines, priapism, a desire to urinate frequently, and even emissions—which occurred without any special sensation preceding or accompanying them. It is evidently necessary to give full consideration to the fact that the saddle ought to be very hard, not at all soft in the middle, in order that the rider may rest his weight on the ischia."

M. Léon Petit : "I do not know that the facts related by M. Moreau are peculiar to old people ; but in youth I have observed that the effect immediately following the immoderate use of the bicycle was impotence rather than excessive excitement."

M. Malécat : "It would be very desirable to see the patients described. It is useful in all such cases to have the opportunity to examine them closely ; many people afflicted with rheumatism complain of pain and inflammation in the region of the urethra and the prostate, which may be caused by an excessive elimination of uric acid through the urine. Besides, we also know that after violent exercise, great fatigue, or excessive prostration, an increased quantity of uric acid is eliminated. That form of internal traumatism might also be considered."

THE CONTRACTILITY OF THE VESSELS was the subject of a communication to the Académie des Sciences by M. Ranvier, on the contractility of the vessels. His microscopical observations were directed to the blood-vessels of a very fine peri-œsophagean membrane of a frog, previously detached from the living animal. "If one of the arterioles of this membrane be examined," said M. Ranvier, "in the living animal and in its own plasma, it shows very distinctly some of its natural elements, and, among them, its smooth muscular fibres and its internal elastic layer. If this same arteriole, carefully prepared for examination, be observed and an induced current sufficient to produce contraction of the muscular fibre be applied, it immediately responds in proportion to the strength of the current. At the moment when the contraction is produced, the folds of the internal elastic tissue are increased; the layers approach and finally touch one another; and by this act the calibre of the arteriole is effaced. If the current be stopped the arteriole gradually returns to its original dimension.

"In regard to this experiment, which I have performed many times, and which shows new conditions of the fine muscular fibres, in passing from the state of repose to that of contraction, I think I can formulate, in regard to the action of the induced current, the following conclusions:

"1. When a weak but sufficient current is applied, the muscular coat of the arteriole is not equally contracted. Some of its parts are in a state of contraction, while others are in a condition of perfect repose. To cause all to contract, a stronger current is necessary.

"2. When, under the influence of a current of moderate intensity, a zone of contraction is caused in the arteriole, which is not displaced while the current is continued; and if, after an instant of repose, the same current is again applied, the zone of contraction is reproduced at the same point.

"3. Nothing can be produced in the arteries by means of direct electrical excitation, which can be compared with a peristaltic movement. That movements of this kind can be produced in the vascular system has been admitted by some physiologists, but this opinion does not seem to be based on any kind of experiment.

"In regard to the action of induced currents on the capillary vessels, I may say that, under the conditions in which my experiments have been conducted, I have never seen the slightest movements take place from the application of the current, whatever may have been its intensity."

THE STRUGGLE BETWEEN THE ORGANISM AND THE MICROBE.—Sanarelli (*Ann. de l'Inst. Pasteur*) discusses the means by which the organism is defended against microbes after vaccination and during recovery. He studied the vaccinal immunity produced against the disease caused by vibrio Metschnikovi. At the outset he shows that this immunity cannot be due to any bactericidal property, to any attenuating power, nor yet to any antitoxic power possessed by the body fluids of the vaccinated animal, for he finds that the serum of vaccinated animals possesses no bactericidal power as maintained by Behring and Nissen, and the microbes grown in such serum increase rather than diminish in virulence. Further, the serum of vaccinated animals possesses no antitoxic properties; microbes developing in such serum actually produce more active toxins than when they are grown in ordinary nutrient media. Having eliminated these three possible causes of vaccinal immunity, he proceeds to show that the preventive and therapeutic properties of this serum depend upon the power possessed by it of causing active phagocytosis. The microbes are engulfed by phagocytes, and enclosed in these they retain their vitality for a considerable time. He believes that although remaining alive at the seat of inoculation, these microbes produce no toxins after being enclosed in the phagocytes, for the blood-serum of such animals is not capable of destroying the toxins if they were elaborated. He finds that marked leucocytosis occurs in vaccinated animals, and in those treated by therapeutic serum, but the leucocytes undergo a most remarkable diminution in other cases. This he connects with the chemiotactic relations between the serum and the phagocytes. Preventive serum does not influence the diseased organism by any action on the bacteria, but by stimulating the proper cells to activity, thereby causing a concourse of phagocytes at the seat of inoculation. When this concourse of phagocytes is prevented, as by exposure to cold, the preventive serum has no effect and death results.

MORTALITY AND MORBILITY STATISTICS.

By Harry Kent Bell, M.D.

Alabama.—Jerome Cochrane, M.D., State Health Officer, Montgomery.

Mobile, 31,076 : T. S. Scales, M.D., Health Officer, reports for the month of April a mortality of 49, of which 25 were colored, and 11 were under five years of age. The annual death-rate per 1000 was 18.84.

Zymotic diseases caused 7 deaths, and consumption, 14.

Arkansas.—D. W. Holman, Secretary, Little Rock.

California.—J. R. Laine, M.D., Secretary, Sacramento.

Reports from 114 cities, towns, villages, and sanitary districts, aggregating a population of 858,413, show a total of 953 deaths from all causes in April. This corresponds to a death-rate of 1.11 per 1000 for the month, or 13.32 per 1000 per annum. There were 193 deaths due to consumption, 70 to pneumonia, 23 to bronchitis, 3 to congestion of the lungs, 4 to diarrhœa and dysentery, 52 to other diseases of the stomach and bowels, 16 to diphtheria, 6 to croup, 10 to scarlatina, 8 to whooping-cough, 13 to typhoid-fever, 6 to cerebro-spinal-fever, 5 to malarial-fever, 26 to cancer, 5 to erysipelas, 77 to diseases of the heart, 5 to alcoholism, and 432 to all other causes.

Connecticut.—Professor C. A. Lindsley, M.D., Secretary, New Haven, sums up the mortality reports for April as follows :

The mortality report for April has been received from 168 towns representing a population of 786,490.

There were 1315 deaths reported in the State during the month. This was 83 more than in March ; it was 263 more than in April, 1892, and 261 more than the average number of deaths in April for the five years preceding the present.

The number of deaths in the first four months of this year compared with the same of each of the five years preceding was as follows: 1893, 5092; 1892, 5665; 1891, 4325; 1890, 4921; 1889, 3936; 1888, 4398.

The death-rate was 218 for the large towns; for the small towns, 19.9, and 21.2 for the whole State.

The deaths from zymotic diseases were 193, being 13.8 per cent of the total mortality.

The deaths from consumption numbered 130.

New Haven, 95,000: Total mortality, 193. Annual death-rate per 1000, 23.7.

Hartford, 58,600: Total mortality, 136. Annual death-rate per 1000, 26.6.

Bridgeport, 55,000: Total mortality, 85. Annual death-rate per 1000, 18.5.

Waterbury, 34,000: Total mortality, 83. Annual death-rate per 1000, 29.3.

DELAWARE.—E. B. Frazer, Secretary, Wilmington.

DISTRICT OF COLUMBIA, 250,000: C. M. Hammett, M.D., Health Officer, reports for the four weeks ending May 27th a mortality of 445, of which number 195 were of colored people, and 150 were under five years of age. The annual death-rate was 22.2 per 1000. There were 59 deaths from zymotic diseases, and 61 from consumption.

FLORIDA.—Joseph Y. Porter, M.D., Secretary, Jacksonville.

The summary, as published in *Florida Health Notes*, for the month of March, is as follows:

Number of counties reporting, 29; number of cities reporting, 3; total population of said counties and cities, 299,937; number of births reported, 342; number of marriages reported, 308; number of deaths reported, 265; birth-rate per 1000 per annum, 13.68; death-rate per 1000 per annum, 10.60; average age of decedents, 31.38; number of deaths under five years of age, 76.

ILLINOIS.—F. W. Reilly, Secretary, Springfield.

Chicago, 1,449,984; J. D. Ware, M.D., Commissioner, re-

ports 2545 deaths during April, representing an annual death-rate of 21.06 per 1000.

The mortality under the age of five years was 1056. The deaths from zymotic diseases numbered 510, and from consumption, 203.

INDIANA.—C. N. Metcalf, M.D., Secretary, Indianapolis.

IOWA.—J. F. Kennedy, M.D., Secretary, Des Moines, reports in the *Monthly Bulletin* for the month of March :

Council Bluffs, 35,000 : Total deaths, 15. Annual death-rate, 5.14 per 1000.

Davenport, 34,500 : Total deaths, 33. Annual death-rate, 11.0 per 1000.

Des Moines, 70,000 : Total deaths, 57. Annual death-rate, 9.7 per 1000.

Dubuque, 40,000 : Total deaths, 34. Annual death-rate, 10.2 per 1000.

KANSAS.—M. O'Brien, M.D., Secretary, Topeka.

KENTUCKY.—J. N. McCormack, M.D., Secretary, Bowling Green.

LOUISIANA.—L. F. Salomon, M.D., Secretary, New Orleans.

New Orleans, 254,000—184,500 white, 69,500 colored. There were reported for four weeks ending May 20th, 609 deaths, of which number 216 were among the colored people, and 274 of children under five years of age. There were 121 deaths due to zymotic diseases, and 56 to consumption. The annual death-rate was 31.27 per 1000.

MAINE.—A. G. Young, M.D., Secretary, Augusta.

MARYLAND.—James A. Steuart, M.D., Secretary, Baltimore.

Baltimore, 455,427 : The total deaths during April were 854—an increase of 25 compared with the corresponding month of April, 1892. Of these 663 were whites and 191 colored—a

death-rate of 20.72 per 1000 for the former and 32.28 per 1000 for the latter. The death-rate per 1000 for the whole population was 22.52. Thirty-five died from infectious diseases, 116 from consumption, 91 from pneumonia, 30 from bronchitis, 7 from influenza, 23 from Bright's disease ; 265, or 30.67 per cent of the total deaths, were in children under five years of age.

During the month 295 cases of infectious diseases were reported—a decrease of 15 compared with the preceding month.

MASSACHUSETTS.—S. W. Abbott, M.D., Secretary, Boston.

Boston, 469,647 : S. H. Durgin, M.D., Chairman.

There were 1065 deaths reported in April, of which number 275 were under five years of age. The annual death-rate per 1000 was 27.21. There were 139 deaths from zymotic diseases, and 141 from consumption.

MICHIGAN.—Henry B. Baker, M.D., Secretary, Lansing.

For the month of May, 1893, compared with the preceding month, the reports indicate that remittent-fever increased in area of prevalence.

For the month of May, 1893, compared with the preceding month, the prevailing direction of the wind was northwest (instead of southwest), the velocity was much less, the temperature was higher, the rainfall at Lansing was 1.22 inches less, the absolute and the relative humidity were slightly less, the day ozone was much more, the night ozone was slightly less, and the height of ground above the water in the well at Lansing was seven inches less.

Compared with the average for the month of May in the seven years 1886–92, scarlet-fever was more prevalent, and erysipelas, intermittent-fever, whooping-cough, and inflammation of bowels were less prevalent in May, 1893.

For the month of May, 1893, compared with the averages for corresponding months in the seven years 1886–92, the prevailing direction of the wind was northwest (instead of southwest), the velocity was slightly greater, the temperature was slightly lower, the rainfall at Lansing was .22 of an inch more, the absolute humidity was less, the relative humidity was slightly more, the day and the night ozone were consid-

erably less, and the height of ground above the water in the well at Lansing was one inch less.

Including reports by regular observers and others, scarlet-fever was reported present in Michigan in the month of May, 1893, at one hundred and eight places ; diphtheria at seventy-eight places ; measles at sixty-eight places, and typhoid-fever at twenty-nine places.

Reports from all sources show scarlet-fever reported at twenty places more ; diphtheria at twenty-eight places more ; measles at nine places more, and typhoid-fever at six places more in the month of May, 1893, than in the preceding month.

MINNESOTA.—C. N. Hewitt, M.D., Secretary, Red Wing.

St. Paul, 155,000 : H. F. Hoyt, M.D., Commissioner, reports for the month of April a total mortality of 126, of which 51 were under five years of age. The death-rate per 1000 was 9.75. The number of deaths from zymotic diseases was 7 ; from consumption, 12.

Minneapolis, 209,000 : E. S. Kelley, M.D., Commissioner.

During the month of April, 1893, there were 175 deaths, representing an annual death-rate of 7.65 per 1000. Zymotic diseases caused 20 deaths, and consumption, 28. There were 66 deaths under five years of age.

MISSISSIPPI.—Wirt Johnson, M.D., Secretary, Jackson.

MISSOURI.—R. C. Atkinson, M.D., Secretary, St. Louis.

NEBRASKA.—F. D. Haldeman, M.D., Secretary, Ord.

NEW HAMPSHIRE.—Irving A. Watson, M.D., Secretary, Concord.

NEW JERSEY.—Ezra M. Hunt, M.D., Secretary, Trenton.

Hudson County, 292,574 : C. J. Rooney, Clerk, reports for 1892, 6533 deaths, of which 2932 were under five years of age. Annual death-rate, 26.5 per 1000.

From zymotic diseases there were 1268 deaths, and from consumption, 638.

Paterson, 90,251 : J. L. Leal, M.D., reports for April 191 deaths, of which number 68 were under five years of age. The annual death-rate was 25.3. There were 30 deaths from zymotic diseases, and 16 from consumption.

NEW YORK.—Lewis Balch, M.D., Secretary, Albany, reports in the *Monthly Bulletin* as follows :

The increase in the mortality, which began in March, and was then estimated at 2000 above the normal for the month, has continued, with a slightly greater increase in April. The average daily mortality is 395, which is about 60 more than in January and February and 8 more than in March ; it is 42 more than in April, 1892. The relative proportion of deaths from zymotic diseases is unusually low ; the deaths from other causes (local diseases), while corresponding very closely with the mortality of March, being greatly in excess of that of the same period of last year. The increase of mortality for the month is not less than 2000 above the normal, and is to be traced to a continuance of the epidemic of grippe, which was estimated to have caused a mortality slightly less than this last month. The increased mortality has, as in March, been much the greatest in the maritime district, where the death-rate from diseases of the respiratory organs and of the nervous system has been unusually large. Of ordinary zymotic diseases, all show an actual as well as relative decrease, except cerebro-spinal-fever, the increased number of deaths from which occurred chiefly in the maritime district. Of the 23 deaths from small-pox, 1 occurred in Callicoon, Sullivan County ; an outbreak is prevalent at College Point, and cases have occurred at Jamaica and in the town of Southold. Consumption participates in the larger mortality from all diseases of the respiratory organs. Of the 11,865 deaths occurring during the month, 9783 were reported from 149 cities, villages and larger towns, the aggregate death-rate of which was 24.86 per 1000 population.

New York, 1,860,803 : Total deaths, 4562—1576 under five years. Death-rate, 29.79. Zymotic diseases per 1000 deaths from all causes, 124.50. Deaths from consumption, 554. There were 25 cases of typhus-fever in the Riverside Hospital April 29th, since which time, to May 27th, there have been

admitted 54 cases. Of this number 27 have died and 25 have been discharged.

Brooklyn, 978,394 : Total deaths, 1990—676 under five years. Death-rate, 24.48. Zymotic diseases per 1000 deaths from all causes, 102.60. Deaths from consumption, 187.

Syracuse, 91,944 : Total deaths, 140—26 under five years. Death-rate, 18.27. Zymotic diseases per 1000 deaths from all causes, 50.00. From consumption, 17.

Albany, 98,000 : Total deaths, 189—47 under five years. Death-rate, 23.00. Zymotic diseases per 1000 deaths from all causes, 147.37. From consumption, 19.

Buffalo, 278,796 : Total deaths, 409—141 under five years. Death-rate, 16.94. Zymotic diseases per 1000 deaths from all causes, 110.00. From consumption, 69.

Rochester, 144,834 : Total deaths, 249—58 under five years. Death-rate, 20.62. Zymotic diseases per 1000 deaths from all causes, 148.20. From consumption, 31.

PRESENT STATUS OF TYPHUS-FEVER IN NEW YORK.

BRANCH OFFICE, HEALTH DEPARTMENT,
NEW YORK, June 23, 1893.

Editor of THE SANITARIAN :

DEAR DOCTOR : In reply to your letter relative to the present condition of typhus-fever in this city, I have to say that since March the number of cases have been gradually diminishing.

At the outbreak, in November last, the disease appeared in the lodging-houses, particularly in and about Chatham Square, and for a while the cases were quite numerous ; however, since May 13th there have been no cases removed from this quarter or from any lodging-house in the city, although a number of the recent cases have been indirectly traced to these houses.

The census of Riverside Hospital (North Brothers Island) for June 22d (yesterday) shows that we have at present 8 cases of typhus-fever under treatment. The census for the corresponding day of last month indicates that on that day there were 32 cases of the disease in the hospital.

Each case is thoroughly investigated, and as far as possible

the relatives, friends, and those who have been in close contact with the patient are regarded as "suspects," and kept under observation for three weeks.

The treatment of the infected apartment, bedding, clothing, etc., by heat-disinfection and fumigation is very radical, and we feel quite certain that in a few weeks the disease will have disappeared.

A. H. DOTY, M.D.,
Chief Inspector of Contagious Diseases.

NORTH CAROLINA.—Richard H. Lewis, M.D., Secretary, Raleigh.

NORTH DAKOTA.—F. H. DeVaux, M.D., Superintendent, Valley City.

OHIO.—C. O. Probst, M.D., Secretary, Columbus.

OKLAHOMA TERRITORY.—J. O. Overton, M.D., Secretary, Kingfisher.

PENNSYLVANIA.—Benjamin Lee, M.D., Secretary, Philadelphia.

Philadelphia, 1,115,562 : M. Veale, Health Officer, reports : In the four weeks ending May 27th, 1893, there were 1872 deaths, of which number 581 were under five years of age. Annual death-rate, 21.8 per 1000. Deaths from consumption numbered 254.

Pittsburg, 255,000 : J. Guy McCandless, M.D., Registrar, reports : During the four weeks ending May 27th, 1893, there were 446 deaths, of which 202 were under five years of age. Annual death-rate, 22.23 per 1000. Zymotic diseases caused 97 deaths, and consumption, 44.

RHODE ISLAND.—C. H. Fisher, M.D., Secretary, Providence, reports for the month of April 535 deaths in a population aggregating 327,458. Annual death-rate, 19.68 per 1000. There were 71 deaths from zymotic diseases, and 55 from consumption.

SOUTH CAROLINA.—H. D. Frazer, M.D., Secretary, Charleston.

SOUTH DAKOTA.—C. B. Alford, M.D., President, Huron.

TENNESSEE.—J. Berrien Lindsley, M.D., Secretary, Nashville.

WASHINGTON.—G. S. Armstrong, M.D., Secretary, Olympia.

WEST VIRGINIA.—N. D. Baker, Secretary, Martinsburg.

WISCONSIN.—J. T. Reeve, M.D., Appleton.

Milwaukee, 250,000: U. O. B. Wingate, M.D., Commissioner, reports for the month of April 335 deaths, of which 169 were under five years of age. Annual death-rate per 1000, 16.08. From zymotic diseases there were 57 deaths, and from consumption, 21.

PROVINCIAL BOARD OF HEALTH OF ONTARIO.—Peter H. Bryce, M.D., Secretary, Toronto.

PROVINCE OF QUEBEC.—Elzear Pelletier, M.D., Secretary, Montreal.

BUENOS AYRES, 554,713: Albert B. Martinez, Director-General of Municipal Statistics.

The motality during the month of March was 966, of which number 483 were under five years of age. From epidemic diseases there were 91 deaths, and from consumption, 70.

MORTALITY STATISTICS ABROAD FOR THREE MONTHS ENDING MARCH 31ST, 1893.

Population, total number of deaths, annual death-rate per 1000, and deaths from small-pox:

London, 4,305,551; 23,693; 22.0; 38. Glasgow, 677,883; 4362; 25.7; 19. Liverpool, 515,507; 3282; 25.5; 6. Manchester, 510,486; 3339; 26.2; 28. Birmingham, 487,897; 2704; 22.2. Leeds, 382,094; 2312; 24.2; 8. Dublin, 349,-594; 2452; 28.1. Sheffield, 333,922; 1675; 20.1; 1. Edinburgh, 265,672; 1374; 20.7. Belfast, 265,123; 1679; 25.3. Bristol, 225,146; 1129; 20.1; 1. Bradford, 221,611; 1177;

21.2 ; 3. Nottingham, 220,551 ; 1050 ; 19.0 ; 2. Hull, 208,-639 ; 1034 ; 19.8 ; 2. Salford, 203,427 ; 1229 ; 24.2 ; 7. Newcastle, 197,026 ; 989 ; 20.1. Portsmouth, 167,284 ; 873 ; 20.9. Norwich, 104,176 ; 606 ; 23.3. Amsterdam, 406,302 ; 2229 ; 21.9. Rotterdam, 203,486 ; 1324 ; 26.0 ; 1. The Hague, 156,497 ; 897 ; 22.9. Paris, 2,424,705 ; 14,606 ; 24.1 ; 13. Lyons, 438,077 ; 2677 ; 24.4. Bordeaux, 240,582 ; 1841 ; 30.6 ; 40. Nantes, 133,443 ; 859 ; 27.0. St. Étienne, 117,-875 ; 801 ; 24.0. Havre, 116,369 ; 812 ; 27.9. Rouen, 111,-847 ; 1012 ; 36.2 ; 1. Reims, 105,408 ; 723 ; 27.4. Nice, 97,720 ; 662 ; 27.1. Nancy, 87,110 ; 583 ; 26.8 ; 3. Limoges, 72,697 ; 478 ; 26.3. Besançon, 54,636 ; 386 ; 28.3 ; 3. Berlin, 1,714,938 ; 8267 ; 19.3. Hamburg, 581,608 ; 2710 ; 18.6. Leipzig, 388,479 ; 1807 ; 18.6. Munich, 380,000 ; 2100 ; 22.1. Breslau, 324,143 ; 2228 ; 27.5. Dresden, 304,519 ; 1752 ; 23.0 ; 1. Cologne, 297,000 ; 1741 ; 23.4. Magdeburg, 224,-303 ; 1045 ; 18.6. Frankfort, 193,144 ; 849 ; 17.6. Hanover, 175,920 ; 749 ; 17.0. Königsberg, 167,099 ; 1129 ; 27.0. Dusseldorf, 159,858 ; 801 ; 20.0. Nuremberg, 156,902 ; 855 ; 21.8. Altona, 153,490 ; 915 ; 23.2. Chemnitz, 152,004 ; 1000 ; 25.5. Elberfeld, 134,745 ; 612 ; 18.2. Bremen, 131,-082 ; 626 ; 19.1. Strassburg, 129,450 ; 776 ; 24.0. Dantzig, 124,849 ; 707 ; 22.7. Stettin, 123,198 ; 774 ; 25.1. Barmen, 122,899 ; 507 ; 16.5. Crefeld, 113,198 ; 522 ; 18.4. Halle, 111,435 ; 593 ; 21.3. Aix-la-Chapelle, 107,472 ; 558 ; 20.8. Essen, 85,753 ; 510 ; 23.8. Vienna, 1,435,931 ; 8276 ; 23.1 ; 14. Buda-Pesth, 539,516 ; 3809 ; 28.2. Prague, 322,910 ; 1889 ; 23.4 ; 69. Trieste, 158,549 ; 1252 ; 31.6 ; 23. Cracovie, 77,144 ; 700 ; 36.3 ; 75. Debreczin, 60,476 ; 371 ; 24.5. Presbourg, 57,190 ; 508 ; 35.5 ; 2. Copenhagen, 334,000 ; 1779 ; 21.3. Christiania, 156,500 ; 714 ; 18.2. St. Petersburg, 954,400 ; 7369 ; 30.9 ; 27. Warsaw, 500,931 ; 3328 ; 26.6 ; 119. Odessa, 315,900 ; 1860 ; 23.6 ; 52. Milan, 426,-656 ; 3630 ; 34.3 ; 4. Genoa, 200,495 ; 1539 ; 30.7 ; 4. Venice, 162,326 ; 1096 ; 27.0 ; 57. Bologne, 141,750 ; 931 ; 26.3 ; 1. Bucharest, 206,000 ; 1550 ; 30.1. Jassy, 80,196 ; 651 ; 32.5 ; 4. Algiers, 75,432 ; 769 ; 40.8 ; 10. Bombay, 821,-764 ; 5442 ; 26.5 ; 37. Brussels, 476,862 ; 2455 ; 20.6 ; 10. Anvers, 232,723 ; 1407 ; 24.1 ; 165. Liège, 153,324 ; 708 ; 18.5 ; 14.

EDITOR'S TABLE.

SANITARIAN, JULY NUMBER, 1893.

☞ALL correspondence and exchanges and all publications for review should be addressed to the Editor, DR. A. N. BELL, Brooklyn, N. Y.

DR. J. RUFUS TRYON, appointed Surgeon-General of the U. S. Navy, May 10th, 1893, as announced in our June number, was born in Coxsackie, Greene County, State of New York, September 24th, 1837, and graduated at Union College, Schenectady, State of New York, in the Class of 1858, receiving the degrees of A.B. and A.M. in course, afterward graduating from the Medical Department, University of Pennsylvania, March, 1861. He then pursued the study of medicine abroad, in Paris, France, until the fall of 1861, when he returned to the United States to enter the military service, and served during the War of the Rebellion. He was appointed Acting Assistant Surgeon, U. S. Army, March, 1862, and served in that capacity until he passed the required examination for the position of Assistant-Surgeon, U. S. Navy, in which latter corps he was appointed as Acting Assistant Surgeon, U. S. Navy, March, 1863 ; and commissioned as Assistant-Surgeon, U. S. Navy, September, 1863. He served until the close of the war with Admiral Farragut, West Gulf Squadron. After the fight at Mobile Bay, August 4th, 1864, had the wounded under his charge at Naval Hospital, Pensacola, Fla. He served after the war as follows : Naval Hospital, Boston, Mass., 1865–66. Detailed to make a special report for the department of the wounded treated in that hospital during the war. Was appointed Assistant, Bureau Medicine and Surgery, Navy Department, in 1866, by the late Hon. Gideon Welles, Secretary of the Navy, and served until 1870. During the whole time, duties most arduous. He became Passed Assistant Surgeon, 1866 ; Surgeon, 1873 ; Medical Inspector, 1891. He had charge during that time of the temporary Small-pox Hospital at Yokohama, during the epidemic

of that disease in 1871 ; and also appointed by Rear-Admiral John Rodgers, then in command of the station, to superintend the building of the present U. S. Naval Hospital at Yokohama, Japan. He was assigned to special duty, New York, during the yellow-fever epidemic at the Navy Yard, Pensacola, Fla., 1873–76. The greatest heroism was shown by Medical Inspector Tryon, in 1874, by offering his services for the yellow-fever epidemic at Pensacola, Fla., *vide* his report of epidemic of yellow-fever at Navy Yard, Pensacola, Fla., during the summer and fall of 1874, on file in Navy Department and published in Sanitary and Medical Reports, 1873–74, Bureau of Medicine and Surgery. His subsequent assignments were : 1876–79, North Atlantic Station ; 1879–82, special duty, New York ; 1882–83, *Alaska*, Pacific Station, South Pacific Coast and Sandwich Islands, *vide* his report on leprosy, Hawaiian Islands, published in the *American Journal of the Medical Sciences*, Philadelphia, 1883 ; 1883–84, member Examining Board ; 1888, marine rendezvous, New York ; delegate International Medical Congress at Copenhagen, Denmark, 1884 ; afterward *Quinnebaug*, European Station and African coast until 1887, *vide* his report on Health Exposition, London ; International Medical Congress, Copenhagen, etc., on file in the Navy Department and published in report of Surgeon-General of the Navy, 1884 ; 1888–91, special duty and member of Medical Examining Board ; received the honorary degree Ph.D., Union College, 1891 ; 1891–93, U. S. Flagship *Chicago*, North Atlantic Station ; duty Montevideo, Uruguay, and La Guayra, Venezuela, *vide* recent reports of services rendered wounded Venezuelan soldiers of both parties at Macuto, dated respectively October 7th and 25th, 1892, on file in Navy Department. His report of the 7th instant bears the following indorsement of Rear-Admiral John G. Walker, Commander-in-Chief of North Atlantic Station :

LA GUAYRA, VENEZUELA, October 7, 1892.

Respectfully forwarded for the information of the Navy Department. In forwarding this report I cannot commend too highly the conduct of Medical Inspector Tryon. His work has been hard, continuous, enthusiastic, and skilful. He has organized and conducted the work most creditably, and while ably assisted by his subordinates, the success

achieved has come from *his* professional ability and enthusiasm.

Very respectfully,

J. G. WALKER,

Rear-Admiral U. S. Navy, Commanding U. S. Naval Force, North Atlantic Station.

A TRAINING SCHOOL FOR THE NAVAL MEDICAL SERVICE.—This long talked-of and much-needed institution has been promptly undertaken by Surgeon-General Tryon. It contemplates what will be practically a graduate course for Assistant Surgeons upon entering the Navy, to qualify them for professional duties peculiar to the office.

For this purpose the Naval Laboratory at Brooklyn is to be elaborated and equipped. The course of training will occupy about three months, and will be conducted by the medical officers on the Examining Boards and others on detailed service in New York.

DR. GEORGE M. STERNBERG, the new Surgeon-General of the U. S. Army, was born June 8th, 1838, in New York. He was appointed Assistant Surgeon in 1861, Captain and Assistant Surgeon in 1866, Major and Surgeon in 1875, Lieutenant-Colonel and Deputy Surgeon-General in 1891. His service has been as follows :

With General Sikes' command, Army of the Potomac, to August 2d, 1862 ; hospital duty, Portsmouth Grove, R. I., to November, 1862 ; with General Banks's expedition and assistant to the Medical Director, Department of the Gulf, to January, 1864 ; in office of Medical Director, Columbus, O., and in charge of U. S. General Hospital at Cleveland, O., to July, 1865 ; with the Thirteenth U. S. Infantry, Jefferson Barracks, Mo., to April, 1866 ; Post Surgeon at Fort Harker, Kan., and in the field from April, 1868, to 1870 (Indian campaign) ; Fort Columbus, New York Harbor, to May, 1871 (yellow-fever epidemic) ; Fort Hamilton, New York Harbor, to June, 1871 ; Fort Warren, Boston Harbor, Mass., to August, 1873 ; ordered to Department of the Gulf, July 22d, 1872 ; Acting Medical Director, New Orleans, La., to Octo-

ber, 1872 ; Post Surgeon, Fort Barrancas, Fla., to August, 1875 (epidemic of yellow-fever in 1873–75) ; on sick leave to May 11th, 1876 ; Attending Surgeon, Department Headquarters, to September, 1876 ; Post Surgeon, Fort Walla Walla, W. T., to May, 1879 ; in the field, Nez Perces expedition, 1877 ; on special duty with National Board of Health, from July, 1879, to August, 1881 ; Member of Havana Yellow-Fever Commission, 1879 ; ordered to Department of California, August 10th, 1881 ; Post Surgeon, Fort Mason, Cal., to 1884 ; Attending Surgeon and Examining Recruits at Baltimore, Md., to October, 1890 ; in charge of Medical Purveying Depot, San Francisco, Cal., to February, 1892 ; Attending Surgeon, New York City, to date of promotion to Surgeon-General.

Dr. Sternberg was brevetted Captain and Major "for faithful and meritorious services during the war ;" and Lieutenant-Colonel "for heroic conduct in the performance of duty at the Battle of the Clearwater, Idaho," in 1877. Dr. Sternberg was delegate from the United States to the International Sanitary Conference at Rome in 1885. In 1887 he was detailed, by direction of the President, in pursuance of an act of Congress, to make investigations in Brazil, Mexico, and Cuba relating to the etiology and prevention of yellow-fever. In 1892 he was appointed Consulting Bacteriologist to the Health Officer of the Port of New York by authority of the War Department, and in compliance with the special request of the Health Officer of the Port of New York and the Advisory Committee of the New York Chamber of Commerce. He is a member of many learned and scientific bodies, and has contributed largely to medical literature, particularly in the field of bacteriology, in which he stands pre-eminent in the United States and among the foremost abroad. Indeed, his extensive service in the field, practical experience in military hospitals and at army posts, making him thoroughly familiar with the requirements and duties of his corps ; and his contributions to the advancement of medical science combine in showing his superior fitness for the office and the wisdom of his promotion.

The President is to be congratulated with Dr. Sternberg—indeed, the Army as well—on this signal tribute to meritorious

service, so well calculated to stimulate ambition on its only true basis, and equally to secure the cordial support of the medical profession, to whom Dr. Sternberg's promotion is also an honor.

DR. FREIRE'S YELLOW-FEVER INOCULATIONS.

To the Editor of The Medical News :

SIR : I regret that I am obliged to occupy your space and my time in correcting a misunderstanding by Dr. Gaston of the extract from my published report quoted in my letter in your issue of April 8th.

The quotation is as follows :

" It is a significant fact that, of the 3051 vaccinated prior to August, 1885, Dr. Freire has only 1 fatal case to report, while out of 460 vaccinated in January and February, 1886, he reports 5 deaths, a mortality of more than 1 per cent, which he gives as the general mortality among those [the non-] vaccinated. That is to say, the mortality among those vaccinated during these two epidemic months was more than 1 per cent. On referring to the mortality of the city for the same two months, he remarks : ' I find the total number of deaths to have been 369, which, in a total susceptible population of 160,000 (Dr. Freire's estimate), would give a mortality of 1 in 436.' "

Dr. Gaston comments on this as follows :

" This is the climax of Dr. Sternberg's array of figures against the statistics of Freire ; that more of his inoculated cases died in a given period than the proportion of deaths from all causes among the population of the entire city, including, of course, in the general result, those identical cases laid at the door of Domingos Freire."

I am not so stupid as to compare the " deaths from all causes among the population of the entire city," with the deaths among those vaccinated by Freire. My report relates to yellow-fever mortality, and the 5 deaths among 460 vaccinated in January and February, 1886, were deaths from yellow-fever. The 369 deaths which occurred in a total susceptible population of 160,000 were deaths from yellow-fever ; and 160,000 is not the " population of the entire city," which ex-

ceeds 400,000, but is the estimate made by Freire himself of the susceptible population of Rio.

Very truly yours,

GEORGE M. STERNBERG.

NEW YORK, May 8th, 1893.

ST. LOUIS'S NEW HEALTH COMMISSIONER.—THE SANITARIAN shares with the *Medical Review* the gratification which it so happily expresses at the recent appointment of Dr. GEORGE HOMAN, Health Commissioner of St. Louis. It has always been our opinion that at the head of the sanitary department of a city like St. Louis ought to be a man who is sufficiently educated in modern scientific medicine to appreciate the sanitary improvements made in the most advanced centres of scientific hygiene. That a great many improvements may be made by our city authorities in order that the hygiene of St. Louis may correspond with the newest scientific discoveries is plain to every one able to judge. New facts in regard to the biology of disease germs being continuously communicated to us from all civilized parts of the globe, we may look forward to great improvements, particularly in the branches of preventive medicine.

With a man having the attributes of Dr. Homan as Health Commissioner, we feel confident that everything possible to be done, in the sense indicated above, will be accomplished to the satisfaction of those that are most able to judge.

THE NEW HEALTH COMMISSIONER OF CHICAGO.—The recent appointment of Dr. A. R. REYNOLDS is cordially endorsed by the medical press of that city, and has received many encomiums by the public press. It is sincerely to be hoped that his administration may be so energetic and signal, that the sanitarians abroad may not again deem it necessary to send over special inspectors to gain information.

BOSTON CITY GARBAGE.—A special committee have reported at length to the city government on the question of the disposal of garbage. They show that the delivery of the garbage of the city proper, South Boston and Roxbury, at one central station aggregates about one hundred and seventy

tons per day. The committee are of the opinion that this large quantity can be handled and treated in a better sanitary manner by the utilization process than by the cremation process, while at other stations, where ten to twenty tons per day are delivered, the cremation process can be operated with good sanitary results.

HAMBURG'S SANITARY CONDITION, according to a published letter from Dr. William A. Wheeler, U. S. Marine Hospital Service, the Chief Medical Officer of Ellis Island, to Immigration Commissioner Senner, under date of May 26th, was far from being satisfactory.

Dr. Wheeler states that he had visited Bremen and found it free of any contagious disease ; but the condition of Hamburg gave him some uneasiness, for he writes that there are large numbers of immigrants housed there in barracks, who come from Russia, Austria-Hungary and Southern Europe *en route* to America, and many of whom are extremely filthy.

The barracks in which these people are confined pending medical examination contain accommodation for one thousand people, and are never empty. So far there had been no disease epidemic in Hamburg, but the people are very uneasy, fearing a repetition of the sad time of a year ago. There has not been a case of cholera in Hamburg since March last.

A FLOATING CHOLERA HOSPITAL has been placed in the Thames, within the city limits of London, for the reception of cholera patients this summer, in case the disease appears there.

CHOLERA ABROAD, according to the *Herald's* latest telegraphic reports, at the time of closing this sheet, as follows :

" PARIS, June 21st, 1893.—The municipal authorities at Montpellier, capital of the Department of Herault, have voted the sum of 25,000 francs for the purpose of building wooden lazarettoes to receive persons who may be stricken with cholera.

" At Alais, in the Department of Gard, the deaths from the choleraic disease prevailing there average three daily. Many children have been attacked by the disease.

"LONDON, June 21st, 1893.—Cholera reports received from Mecca show that from June 16th to June 20th there were 830 deaths from the disease in that city.

"ST. PETERSBURG, June 21st, 1893.—Cholera is decreasing rapidly throughout Russia. In Bessarabia, Podolia, Kursk, and Orel only an occasional death and a few fresh cases are now reported."

IS CHOLERA PASSING THROUGH OUR GATES?

Editor of THE SANITARIAN:

In March the writer sent the Halifax City Council the February SANITARIAN, containing an article he had plainly marked, which would clearly indicate that history would not repeat itself if Halifax has not endangered America by making herself the possible gate for cholera to pass through during the winter, to develop later in the spring or summer in Canada and the United States.

A few extracts will be given from the article in question, and your readers can judge for themselves if there is any cause for alarm:

"Prior to May 1st, 1832, 30,000 immigrants had arrived in the St. Lawrence River from infected ports in Europe, and yet not a single case of cholera developed in Canada or the United States, until the middle of June, 1832, when the first case occurred in Montreal, and from this centre of infection it spread throughout the United States.

"In December, 1848, a cholera ship landed in New York, but no case developed outside of the Lazaretto until May, 1849, nearly six months after the deaths at quarantine.

"In November, 1853, twenty cholera ships arrived at New York, on which 1141 persons had died of cholera, and it did not obtain a foothold in the country until it broke out in St. Louis in January, 1854; then it struck Chicago in April and Detroit in May and New York in June, when it became an epidemic.

"In the spring of 1866 the steamer *England*, of the National Line, carried the cholera into Halifax. There were 8 cases and 5 deaths among those who had to do with the vessel in Halifax. She proceeded to New York, where on April 20th

she landed 895 passengers and 116 officers and men, having lost 316 by cholera. There were only 21 cases of the disease in New York up to July 8th, 1866, though there were frequent arrivals of cholera ships during all the time. In July it made its appearance in Memphis and decimated that city.

"In December, 1872, and January, 1873, nearly 2000 immigrants arrived in New Orleans from cholera infected districts in Europe, but it was only in May or June the first case occurred."

Is not Halifax herself the most in danger? Does she not require to be raked and fixed from stem to stern not to risk, or even to invite any disease which in her present sanitary condition would mean death to many of her citizens and poverty to her as a city? She has fought against all odds for over a generation, and now would not a cholera visit mean her ruin as a city for years at least?

Is Halifax, one of the most magnificent sites for the metropolis of Nova Scotia—which country is probably the finest combination of land, water, situation, resources, and climate of any on the globe—to remain a menace to the commerce and health of all nations? Where are her medical school, her scientific and educated men and her humanitarians, when for more than a century she has been more or less *rotten* with all the diseases that dirt and skin expenditure of money can make her?

Instead of setting a good example to smaller places, she "leads" the tail of the procession. Let her awake, or when she is obliged to stand on her own feet and control her own affairs, as she must sooner or later, she will find that disease has palsied her hands, brains, and soul, and the incoming men will come as rulers, not as fellow-citizens. Let the sensible men of Halifax work together, and in her public meetings, as a rule, exclude clergymen, lawyers, politicians, and other professional talkers, and talk business. As it is, the very name of Halifax causes a smile of *contempt or derision* where known, for her way of doing business.

E. P. McLean.

New Glasgow, N. S., May 29th, 1893.

LITERARY NOTICES AND NOTES.

THE SOIL IN RELATION TO HEALTH. By H. A. MIERS, M.A., F.G.S., F.C.S., etc., and R. CROSSKEY, M.A., D.P.H. 12mo. Illustrated. Pp. 150. London and New York: Macmillan & Co.

This is a practical work of much importance to architects, builders, and housekeepers, as well as to sanitarians. It comprises so much of the principles of geology as are particularly related to surface and subsoil moisture, and the conditions likely to render such moisture dangerous to health; the kind of soil most likely to be infested with micro-organisms; the distribution of water in soils; constituents of water derived from the soil; ground air and geological distribution of disease. The salutary influence of the removal of subsoil water is clearly shown by the decrease in the ratio of mortality from consumption in many English towns; and Pettenkofer's theory of the influence of the rise and fall of the ground water on the prevalence of typhoid-fever in Munich, perspicuously illustrated. Numerous illustrations show the trend of subsoil water in different soils, and the avoidable dangers by a knowledge of them. The part that soil plays in relation to rheumatism, pneumonia, "malaria" and other diseases is cogently stated, so clearly and so devoid of technicalities as to render the work exceedingly useful to all intelligent readers.

LESSONS IN PHYSICAL DIAGNOSIS. By ALFRED L. LOOMIS, M.D., LL.D., Professor of the Practice of Medicine and Pathology in the University of the City of New York. Tenth edition, revised and enlarged. Octavo. Illustrations, some in color. Pp. 240, extra muslin, price, $3. New York: William Wood & Co.

If anything more than the author's name were needed to attest the great value of this work to students and practitioners, the fact that it has reached a tenth edition would be convincing; but the author of it is too well known as a progressive practitioner for any physician or medical student to be con-

tent with anything less than his latest conclusions. This, the *tenth* edition, of a work which physicians generally have long since learned to keep within arm's length, has been thoroughly revised, largely rewritten, and a new lesson on "Clinical Microscopy" added, in order to bring it fully up to date as a practical guide, and it is more than ever necessary to all medical practitioners who would avail themselves of the most necessary knowledge in curative medicine.

ELECTRO-THERAPEUTICS OF NEURASTHENIA, by W. H. ROBINSON, M.D., and SEXUAL WEAKNESS AND IMPOTENCE, by EDWARD MARTIN, M.D., are monthly issues, 12mo, pp. 72 and 102 respectively, of the "Physician's Leisure Library" series of handbooks, at $2.50 a year, 25 cents a copy. George S. Davis, Detroit.

They are practical *résumés* of the subjects treated of, useful to all physicians.

SLAVERY AND THE SLAVE TRADE IN AFRICA, ILLUSTRATED. By HENRY M. STANLEY. Harper's Black and White series. New York: Harper & Brothers.

This is a book of one chapter, concisely describing the continued practice of slavery in the interior of Africa. Gradually being encroached upon as it is, however, by the approach of civilizing forces and the development of commercial resources and wealth, in a region manifold more vast and no less healthful than the southern portion of the United States, all true friends of the Afro-American should exert themselves to reanimate the whilom spirit of the abolitionists, and earnestly urge the "freedmen" of the United States, who are not free, to return to their ancestral home and realize to the full the long-promised boon of freedom, which experience has taught them is not attainable among a people to whom they have once been in bondage.

However true much that was said and written of the unhealthfulness of Liberia, Sierra Leone, and other places on the *coast* of Africa, to which our knowledge was almost wholly limited until during recent years, under the enlightening influence of Livingstone, Stanley and others, and the host now following their wake by steamboat and railway, enough is

now known of the healthfulness and industrial resources of the interior, already accessible, to justify the highest ambition of every Afro-American who will emigrate thither, and his every friend who will urge him so to do.

"THE MOST INHUMAN WAR OF RACES carried on in any country of our globe," says the *Weekly Review*, "is, on the whole, that which the Spanish colonists of the Philippine Islands are still waging against the Negritos, the aborigines of the highland districts. The campaigns of extermination are managed by professional *barbareros* (barbarian killers), who continue their manhunts for weeks together, and smoke cigarettes while they assort the gory trophies of a successful expedition. Pitfalls, bloodhounds, and bone-breaking steel traps are considered lawful weapons against the detested savages, who retaliate with showers of poisoned arrows, but rarely venture to encounter their enemies in the open field. Intellectually the Negritos are far below the level of the African, and the young show much less aptitude for European habits; but that lack of docility (from a pedagogue's point of view) does not seem to preclude a large share of cunning; and Professor Rieger, who passed several years in the uplands of the Philippines, says that the ambuscades of the persecuted natives are contrived with superlative skill, and with a versatility of stratagem that has again and again baffled the veteran scouts of the colonists. In the long run, of course, gunpowder must prevail against arrow poison, and before the end of this century the last strongholds of the savage highlanders will probably have been forced. Even now the *barbareros* insist on monthly wages, since their hunting-grounds have been too nearly exhausted to make the government scalp-premium a sufficient motive of enterprise.

"The origin of the human species can probably be traced to the equatorial zone, and it appears that, with strict conformity to hygiene, we could prosper in almost any part of the tropics—deserts alone excepted. Still, the poet's description of the eternal summer regions—

> "'Where every prospect pleases,
> And man alone is vile,'

cannot be taken very literally."

LISTERINE is an ornate pamphlet, by the Lambert Pharmacal Co., St. Louis, Mo., giving the composition and medical properties, and describing the numerous uses of Listerine, of which it treats, not only as one of the most agreeable of all deodorants, but as a topical application—in many cases—actively disinfectant. Listerine is particularly commendable and well adapted for use in diseases of the throat and nasal cavities. Dr. Seiler states that it speedily destroys the stench of ozæna when properly diluted and employed as a spray. He directs its use to be preceded by preliminary cleansing with bicarbonate of soda. It is also commendable, properly diluted, as an application to ill-conditioned ulcers, mucous patches, contagious catarrhal affections, and as a dressing for suppurative wounds. It has an extensive application in obstetrical practice, and is highly recommended by many distinguished physicians. It is at once one of the most agreeable as well as most efficient of all mouth washes and gargles, and has a deservedly extensive use among dentists. As an internal remedy also there are many indications for its use. For particular details of its extensive application in medicine, surgery, obstetrics, and dentistry, the reader should procure the book.

THE "SCIENCE OF HEALTH" is an important department in the *Phrenological Journal*, always presenting practical information of value to the sanitarian and the general reader. "Child Curiosity," the suggestive little story about "Smiling Muscles," "A Report on Hypnotism," "Diet and Work," and "Self-Dosing with Drugs" are all good reading.

The Phrenological Journal and Science of Health, $1.50 a year, 15 cents a number. Address, Fowler & Wells Co., Publishers, 23 East Twenty-first Street, New York.

VAGARIES OF SANITARY SCIENCE. By F. L. DIBBLE, M.D. 8vo, pp. 462. Philadelphia: J. B. Lippincott Co.

A scandalous book, which justifies the inference that the author has been made to feel the whip of some dutiful health officer, for the promotion of the fallacies which he encourages —the wholesomeness of filth and the disregard of health ordinances. He seems to have searched sanitary literature to

some extent for what he could find to justify *his* limitation of preventive measures against disease: "'Sanitary Codes,' every one of which, if we except those pertaining to isolation and vaccination, is useless, silly, and oppressive, and has no bearing whatever on public or private health." Yet, while admitting the contagiousness of small-pox and the value of vaccination, he encourages *keeping* the corpses of the dead of small-pox and other infectious diseases, and public funerals of such, because (so limited is his knowledge on such matters) "except one or two apocryphal cases, . . . the author has found none reported in the medical journals that would indicate that there is any danger from the body of the dead of contagious diseases." "In every instance where the effects of sewer-gas on the human system has been studied on an enormous scale, it has been proved to be innocent." "All experiments in exhumation prove that the soil does not become *saturated* (italics ours) with either solids, liquids, or deleterious gases; that the water of wells near cemeteries has been proved by experience and by chemical analysis to be innoxious; that analyses of soil in and near graveyards show the same result as arable soil elsewhere that has never been infected." To sustain such vagaries the author garbles and distorts extracts from sanitary literature, all along from the Mosaic record to THE SANITARIAN, in illustration of the folly of attributing disease of any kind to filth, but with some singular omissions, considering his purpose to show the wholesomeness of filth under all circumstances. He does not even mention Howard in his enumeration of sanitary cranks, nor the Black Assizes as a praiseworthy illustration of the advantages of a filthy court house.

Yet, to practise his precepts would be to cease attention to the water supply, no matter what the amount of sewage, ordure, or cemetery seepage flowing into it, it is none the less wholesome on that account; sewer air is wholesome for flushing bedrooms; the milk to be used by ourselves and given to our children should be that derived from slop-fed and murrained cows; the most healthful spot in the city of New York is in the midst of the most dirt and squalor; choose for the most healthful building sites cemeteries—in short, to escape cholera, typhus, diphtheria, and the whole category of dis-

eases heretofore thought to be more or less controllable by sanitary measures, revel in filth, put a stop to the wastefulness of food inspection—it is injustice to the poor—that which is condemned and destroyed is frequently the most wholesome, live on it and you will be healthy !

It is a mischievous publication : damnable to the author and surprisingly discreditable to the publisher.

Apropos to the foregoing, we here append :

Effects of Filth on the Death-Rate.—According to the Administration Report of the Madras Municipality for 1891–92 the death-rate of the town of Madras for the year 1891 amounted to the appalling rate of 52.6 per 1000 of population. Of the 23,808 deaths which took place, 66 were due to small-pox 372 to measles, 6731 to fevers, 4573 to bowel complaints, and 1916 to cholera, making a total of 13,658 from these causes, or 57 per cent of the whole ; 5843 infants under one year died (excluding still-births), 437 per 1000 of population, or 30.19 of children born alive. The explanation of these terrible figures is given in the report in the following words : " An indifferent water supply, defective drainage, and over a considerable portion of the municipality no drainage system at all, a porous soil loaded with organic impurity, a putrid and fluctuating subsoil water rising comparatively near the surface, want of open spaces in some parts of the town, crowded parcherries (villages) for the poor, overcrowded and ill-ventilated houses for the middle class (in many cases directly connected with the subsoil), water by wells in their interior, burial grounds and slaughter-houses in the city, and, lastly, the general, social, conjugal, and religious habits and customs of the people." In the district of the town in which the mortality was highest the unsanitary conditions are described as ghastly. The first division, with a mortality of 72.8, " contains some of the largest parcherries in the municipality, with wretched huts huddled together, in some cases, on a soil that, after a shower of rain, forms a slough of liquid filth." The third division, with a death-rate of 56.7, has " narrow streets of overcrowded and badly ventilated houses, most of which have wells in their interior connecting them with the subsoil water, which is here very putrid." It is in

these divisions that the highest death-rate from cholera also occurred. The report, in fact, makes it strikingly evident that, even excluding scarcity and dearness of food, which is assigned as a cause of the exceptional mortality of the year, the sanitary conditions of the town are such as render the high tribute which disease and death levy from it no cause of wonder.

DIBBLE ought to be expatriated to Madras, where he could gloat himself amid conditions congenial to his taste.

GUARDING THE PUBLIC HEALTH.—For the effective prevention of bacterial disease two sets of forces must act in concert: First, the people must know wherein the great sources of danger lie, and that by simple, intelligent cleanliness these sources of danger may be largely sealed.

But the fact that his danger of acquiring infectious disease comes to the citizen largely from without his walls, and from sources which he cannot directly control, leads us to the second and greater force which must be brought to bear if we are to enter into and retain our restored inheritance—that is, to the individual and concerted action of local health boards. These organized bodies of men devoted to the interests of the public health must now add to the powers which they have wielded so long and so well the weapons won from the new knowledge. To see to it that water supplies are kept unpolluted; that human waste is safely disposed of; that food supplies are not derived from infectious sources; that streets and other public places are kept clean; that overcrowding in schools, tenements, and lodging-houses is not allowed; that proper measures of isolation, disinfection, and cleansing shall be practised wherever infectious disease occurs; that the citizen may be intelligently counselled whenever in doubt about his sanitary surroundings, or coerced to cleanliness when ignorantly or wantonly at fault—these are some of the tasks which rest in the hands of local health authorities, and upon whose intelligent and faithful execution our immunity from infection so largely depends.—*Dr. T. Mitchell Prudden, in the June Century.*

ABUSE OF THE STOMACH.—There is no ailment more common in middle life and in old age than indigestion. This, of

course, depends upon improper food taken too frequently and in undue quantity. As a rule, the victim of indigestion flies to medicines for relief, or to one of the thousand-and-one quack remedies that are advertised to cure everything.

How much more rational would it not be to alter the diet, and to give the stomach the food for which it is craving! If the stomach could talk, I can imagine it, after pills, and gin and bitters, and quack remedies of every description have been poured into it, begging to be relieved of such horrors, and saying, "Give me a little rest, and a cup of beef tea and a biscuit, and go and take a little fresh air and exercise yourself." Instead of this, the miserable organ has to be dosed with all sorts of horrible concoctions in the way of drugs, brandies and sodas, and champagne, to endeavor to stimulate it into action. There is no doubt that the stomach that requires stimulants and potions to enable it to act efficiently can hardly be said to be in a healthy state, or can long continue to do its work properly.

The digestive organs, unfortunately, are the first to sympathize with any mental worry. They are like a barometer, and indicate the errors of malnutrition and their consequences. The healthy action of every organ depends upon the proper assimilation of the food taken. As soon as the digestive process fails, everything fails, and ill-health results, with all its disastrous concomitants.—*From Why Grow Old? by Dr. N. E. Yorke-Davies, in The Popular Science Monthly for June.*

Labor and Relaxation.—Drudgery is vile. Every properly constituted person admits that, and the system of short spells of toil and long intermissions of repose, in so far as it annihilates drudgery, is a system that deserves all the popularity it enjoys. The fault with it lies in those short periods of toil. Some poor creatures who have to work find it so intolerably hard to get back to labor after a long spell of loafing, that they would rather work a little every day than undergo the pain of forming new habits of application every time they have anything serious to do. Such persons complain that the shadow of the approaching curse darkens all the interval of what should be careless sunshine. They prefer to strain their fate to their bosoms by a continuous hug, thinking

by that method to squeeze some of the life out of it, and make it easier to wrestle with. They complain that it is almost as hard to stop working as it is to begin again ; that they feel lost and bored for a while without their daily task, and find it a hardship to devise occupation, and that by the time they have brought themselves into fit condition to join the leisure class their money is all gone, and it is time for them to begin work again. It may be said that such persons are defective, and their shortcomings should not avail to bring down adverse judgment on a system that is intrinsically good. Still, a system to which exception is taken by wholesale may require amendment.—*From Harper's Weekly.*

" WYOMING—Another Pennsylvania," is the title of a vigorously written article by Julian Ralph, in *Harper's Magazine* for June. The free, aggressive spirit of the Newer West pervades Mr. Ralph's description of this strong young State and its splendid resources. With the article is printed a new map of Wyoming.

Wyoming is not an exceptionally large State, yet it is as big as the six States of New England and Indiana combined. Indiana itself is the size of Portugal, and is larger than Ireland. It is with more than ordinary curiosity that one approaches Wyoming during a course of study of the new Western States. From the palace-cars of the Union Pacific Railroad, that carries a tide of transcontinental travel across its full length, there is little to see but brown bunch-grass, and yet we know that on its surface of 365 miles of length and 275 miles of width are many mountain ranges and noble river-threaded valleys of such beauty that a great block of the land is to be forever preserved in its present condition as the Yellowstone National Park. For the rest, most well-informed citizens outside the State know nothing more than the misnaming of the State implies, for the pretty Indian word Wyoming, copying the name of a historic locality in the East, is said to mean " plains land."

UNIVERSITY EXTENSION.—The actual work of the extension of university teaching is carried on by the University Extension lecturer, and it is his career that is a new and promis-

ing element in our educational life. As he gives only one lecture a week or one a fortnight before the same audience, he leaves them time to do considerable study between the lectures. By taking audiences in different places, he is enabled to utilize the same course of lectures many different times. Thus, he may lecture every Monday night at place A, every Tuesday night at place B, every Wednesday night at place C, etc. By thus limiting the field covered by his lectures he is enabled to work it over more carefully and post himself more thoroughly upon it every time he repeats the course.—*From Professor Edmund J. James's article, "A New Career for College Men," June Review of Reviews.*

A NEW PROFESSION.—A fine and profitable business for women, pursued as a profession, is that of housekeeping. Every woman thinks herself fitted to "keep house;" but in sober truth those who are really fitted for it—that is, those who are thoroughly educated in its requirements so that they would have a right to practise it as they would any other trade or profession and receive money for it—are by no means many. Yet if the women who have peculiarly strong domestic inclinations would recognize that the trend of their talent is toward housekeeping, and then prepare themselves seriously from the first step to the last, there would be a sensible addition made to the comfort of the world, and a new opening established through which many women, instead of now and then one, could earn their livelihoods.—*From Harper's Bazar.*

THE PAN-AMERICAN MEDICAL CONGRESS.

WASHINGTON, SEPTEMBER 5TH–8TH, 1893.

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THE SANITARIAN.

AUGUST, 1893.

NUMBER 285.

CONSIDERATIONS CONCERNING ASIATIC CHOLERA.*

By A. C. ABBOTT, M.D., First Assistant, Laboratory of Hygiene, University of Pennsylvania, Philadelphia, Pa.

IN acknowledging the honor that has been done me by your invitation to address you, I do so with a full appreciation of the importance of the subject upon which I have been asked to speak.

The question that is at present of perhaps the greatest moment not only to the medical men of this country, and of Western Europe, but to the laity as well, is that involving the probable reappearance of Asiatic cholera during the coming summer. I have been asked to present to your notice some of the facts in connection with the bacteriology of this disease, and do so in the hope of contributing to a more complete understanding of the channels through which it is disseminated, and of the fundamental principles that underlie a rational prophylaxis against its spread. In order to do this, I must ask you to accept, without question, the modern teaching in relation to cholera, namely, that it is an infectious disease, depending for its existence and propagation upon a specific micro-organism that is located within the intestinal canal of all individuals affected with this disease. This micro-organism is now generally believed to be that described by Koch, commonly known as the "comma-bacillus" of Asiatic cholera. Though there were for a time after Koch's announcement certain objections to accepting his teachings in relation to the etiology of cholera, these have now practically disap-

* Address delivered before the American Climatological Association, Philadelphia, Pa., May 25th, 1893. (*Medical News, June 10th*, 1893.)

peared, and the weight of opinion is incontestably in favor of the doctrine that he taught.

With the announcement that a definite *materies morbi*, most probably standing in causal relation to this disease, had been found, the attention of the medical world was at once directed to it, and on all sides efforts were made to become familiar with the characteristics of this organism and the means commonly employed for its identification. Perhaps nothing can give a better idea of the impression made by this contribution than the sudden and continuous increase of applicants for admission to the laboratory of which Koch was at that time director. So great was the demand that it became necessary, in order to satisfy it, to organize special courses of teaching, in which only the questions concerning cholera, its diagnosis, and the means of preventing it were considered. This widespread interest in the subject naturally opened up channels through which many contributions that have added much to our knowledge of the subject have been received.

In so far as the morphological and cultural peculiarities of the organism are concerned, Koch left but little room for addition to his original description, but this represented only the foundation upon which was to be built a superstructure so rich in experimental data as to warrant our claiming acquaintance with the behavior of this organism under the manifold conditions of environment that it finds, not only when located within the intestinal canal, but when outside the body as well; and it is through investigations of this character that we receive the teaching upon which our plans of public quarantine and of domestic and personal prophylaxis are to be based.

In epidemics of cholera, manifestly, the danger against which we are to guard exists in the evacuations of the afflicted individual; and if the evacuations from each and every such individual were disinfected immediately upon being passed, it is safe to predict that the appearance of the disease in an epidemic form would be a thing unknown. Unfortunately, however, this precaution, simple as it is, is more often neglected than employed, and the consequences of such neglect are those that are causing the present agitation.

The question, then, that arises is: If these evacuations do not receive the proper attention at the hands of the attendant,

are they likely, after having gained access to sewage or water-courses, to cause a dissemination of the trouble?

Among the facts earliest demonstrated in connection with the organism of cholera, was, that it belonged to the group of bacteria known as facultative parasites—that is to say, it is an organism that is by nature parasitic, but which can exist for a time outside the body of a living host, and lead a saprophytic form of existence. Perhaps the first observation that conclusively settled this point was the finding by Koch, in a water-tank, at Sahab Bagan, Calcutta, on February 8th, 1884, of living comma-bacilli, which could be continuously demonstrated in this water up to the 23d of the same month. With this observation in hand, preparations were at once begun for determining accurately the conditions that favor the life and development of the organism in water, and though the results of these investigations are conspicuous for their lack of uniformity, they, nevertheless, demonstrate the possibility of this organism, not only retaining its vitality but multiplying, as well, in the purest of natural waters; and, contrary to what would *à priori* have been supposed, its growth is not only not favored by gross pollution of the water, but when the contamination is excessive the effect is to shorten the length of time that the cholera-spirillum may live in it. Among the first to take up this study was Koch himself, who states that in ordinary spring-water or well-water the organism of cholera retains its vitality for thirty days, whereas in the canal-water (sewage) of Berlin it died after six or seven days; but if this latter be mixed with fecal matters, the organism retains its vitality for but twenty-seven hours; and in the undiluted contents of cesspools it is impossible to demonstrate it after twelve hours. In the experiments of Nicati and Rietsch it retained its vitality in sterilized distilled water for twenty days; in Marseilles canal water (sewage), for thirty-eight days; in sea water, sixty-four days; in harbor water, eighty-one days, and in bilge water, thirty-two days.

In the experiments of Hochstetter, on the other hand, the cholera spirilla in distilled water died in less than twenty-four hours in five of seven experiments; in one of the two remaining experiments they were alive after a day, and in the other after seven days.

In one experiment with the domestic water supply of Berlin the organism retained its vitality for two hundred and sixty-seven days; in another for three hundred and eighty-two days, notwithstanding the fact that many other organisms were present at the same time. There is no single ground upon which these variations can be explained, for they depend apparently upon a number of factors, which may act singly or together. For example, in general it may be said that the higher the temperature of the water in which these organisms are present, up to 20° C., the more active is their multiplication; the purer the water, that is, the poorer in organic matter, the more quickly do they die; whereas the richer it is in organic matter, up to a certain limit, the more rapid is their proliferation.

Still another point that must be considered in this connection is the antagonistic influences under which these organisms find themselves when placed in water containing organisms that are, so to speak, at home in water—the so-called normal water bacteria; and Buchner has recently reported experiments to show that when suspended in fluids, and exposed to the direct action of the sun's rays, not only the cholera spirillum and the bacillus of typhoid-fever, but other pathogenic organisms as well, are robbed of their vitality in a relatively short time. Pettenkofer and his associates have also recently recorded observations, not as yet, however, complete, that indicate a part played by higher water plants in diminishing the number of bacteria that may have gained access to water in which they are growing.

Though considerable variation is seen in the results of these experiments, they, nevertheless, agree in the single point—viz., that the cholera organism can live and does multiply in natural waters; but there is no reason for believing that a single contamination of a water-course used for drinking purposes, with a cholera or typhoid stool, is sufficient to cause a widespread epidemic of the disease through the multiplication of the organisms added, and it is more than probable that, when such an outbreak occurs, it is due to continuous pollution by relatively large quantities of this material. As water is one of the elements essential to life that is ordinarily used in common by all the individuals composing a community, it

is probably the agent most frequently concerned in the propagation of epidemic outbreaks of diseases of which Asiatic cholera and typhoid-fever may be taken as types.

In very recent times we have heard a great deal about the part played by water in the dissemination of disease, and while what we have heard is, in the main, true, it is only partly true, and in consequence, the public, while awake to the possible danger from this source, does not, I fear, quite appreciate the point or points at which the greatest danger is to be anticipated. The result is that precautions are taken in one direction, and neglected in another of equal or more importance. To define more clearly at what I am driving: many individuals will say with confidence that they have no fear of cholera entering their household, and will give as a reason that only boiled water is drank, but if the individual is asked if only boiled water is used in washing his green salads, or for rinsing his milk jug, or if he is certain that boiled water is employed in the manipulation of the dairy from which he receives his milk supply, the probabilities are vastly in favor of his reply being in the negative. The danger is not alone in the drinking of waters polluted by disease-producing elements, but also, and probably to a greater extent, in the general use of such water about the household. A very vivid example of the part that polluted water may play in the production of diseases, even though it be not drunk, is the outbreak of typhoid-fever in the Third Brandenburger Regiment, described by Gaffky. Every source of infection was excluded except a pump, the water of which was used in rinsing dishes, beer mugs, etc. Investigation showed that the well of this pump was in direct connection through the soil with a privy pit a short distance away, into which the evacuations of a typhoid patient had some time previously been thrown. As stated, the water from this pump was not used for drinking purposes, but was employed only about the scullery.

A relatively small amount of water used in the average household goes for drinking purposes, the most being used for kitchen and bath purposes, and of that employed in the kitchen a large amount is subjected to the disinfecting influence of heat. A certain proportion, however, greater than that used as drink, is not heated, but is employed for rinsing,

diluting, etc., and in one way or another comes in contact with food-stuffs, some of which are rendered free from danger through cooking, while others come to the table in a raw state. The food-stuffs from which the greatest danger in this connection is to be feared are milk and salads that are used in an uncooked condition. The rinsing of a milk-jug with water consumes ordinarily far more water than the average individual takes at a draught, and if the water be but very slightly polluted with disease-producing organisms the amount taken as drink may not be sufficient for the production of disease ; but if a single pathogenic germ adheres to the sides of the vessel that has been cleansed for the reception of the milk, it rapidly multiplies into many thousands after the milk has been received. Unpleasant as this thought is, it is, nevertheless, one that we cannot ignore. Though only hot water may be employed in the kitchen, there is still the possibility that the milk supplied from the dairy may at the time of delivery be acting as a culture-medium for the organism against which efforts at home are being directed. This need not, of necessity, be due to dishonest dilution of the milk with water, but may arise from the water with which the milk cans were rinsed, and in this connection dairymen should under no circumstances ship their milk in cans that have not been thoroughly *scalded immediately before the milk is placed in them.* In times of epidemics of diseases of this character it is neither wise nor safe to use milk that has not been subjected to the action of heat, either by boiling or steaming, ; and though prejudice exists, particularly in this country, against the use of cooked milk, it is, nevertheless, our duty to recommend it.

Koch's experiments, and more recently those of Uffelmann, have demonstrated that the comma-bacillus is not robbed of its vitality by freezing ; and the investigations of Fraenkel in Germany, and of Prudden in this country, have shown that natural ice may contain anywhere from a few hundred to several thousand bacteria per cubic centimetre. While the bulk of these bacteria are ordinary, innocent saprophytes, there is, nevertheless, a possibility of ice being a source of danger. I do not mean to discountenance the general use of ice, but rather the putting of natural ice *into* water to be drunk.

Still further, in this connection, is a consideration of domes-

tic water-filters. While the results obtained by their use are desirable from an æsthetic standpoint, they nevertheless furnish a false sense of security. The best of them are reliable for only a few days—four or five at the most—and unless they are properly cleansed by scrubbing and "burning out" the condition of the water, from a bacteriological standpoint, after this period is far worse than that of the unfiltered water. When filters must be used, the water, to be absolutely safe, should be boiled *after* filtration and not *before*, as is often the practice.

As the danger against which we are to guard in cholera exists in the evacuations of afflicted individuals, it is manifest that by careful attention to these matters we have in our power the means *par excellence* for limiting its spread. A great deal is said and written as to disinfection and disinfectants, and just now the makers of these preparations are busy preparing for an active trade in the near future. Fortunately, the organism causing the disease is among the least resistant of any of the known pathogenic bacteria. It does not form spores ; it is highly sensitive to the action of acids and alkalies, and it is killed in five minutes when cultures of it are exposed to a temperature of 65° C. From this it is plain that it is easily within the reach of all those concerned in the treatment or care of cholera patients to render the evacuations of these patients entirely free from danger without the employment of complicated or uncertain processes.

The simplest and at the same time the most reliable disinfectants for the stools of cholera patients are chloride of lime, milk of lime, and boiling water. A 1 per cent solution of good chloride of lime has been shown to destroy the cholera spirillum in fæces in ten minutes. It should be made up as a 2 per cent solution and added to the evacuations volume for volume. Milk of lime, ordinary fluid whitewash, when added to these evacuations until the entire mass reacts distinctly alkaline completely disinfects them in one hour. *Boiling hot* water added to these stools, in the proportion of three parts of the water to one of the evacuations, renders them free from danger in ten minutes.

When possible, the disinfection should take place as soon as the stool has been passed ; but when this cannot be done,

the vessel containing the evacuation or vomit should never be allowed to stand either inside the room or anywhere else uncovered. The reason for this is that flies are known to carry infection from these sources, and it is not improbable that food-stuffs have been infected through this agency. Uffelmann found living cholera spirilla upon a fly two hours after it had come in contact with a fluid culture of this organism.

There is still another point in connection with the dissemination of cholera—viz., the possibility of its being carried from one locality to another in clothing, baggage, and effects generally of persons who have themselves recovered from the disease, or who have been in places in which the malady was prevalent. Have we any experimental data that may serve to shed light upon this part of the subject? The experiments of Koch and of Kitasato are perhaps the most reliable.

When completely dried, according to Koch's experiments, cholera organisms do not retain their vitality longer than twenty-four hours, but by others their vitality is said to be destroyed by an absolute drying of three hours. In the moist condition, as in artificial cultures, their vitality can be retained for many months, though repeated observations lead us to believe that, under these circumstances, their virulence is diminished. According to Kitasato they retain their vitality when smeared upon thin glass cover-slips and kept in the moist chamber for from eighty-five to one hundred days, and for as long as two hundred days when deposited upon bits of silk thread.

It is hardly probable that, as dried upon clothing, the drying is absolute ; and we see from the experimental data that in this condition the organisms may retain their vitality for a sufficiently long time to again give rise to the disease when favorable conditions are present. Fortunately, as has been stated, the organism is markedly susceptible to the influence of heat ; and it is, therefore, a matter of but little difficulty to render such clothing free from danger. For large quantities of clothing, as one finds in the effects of suspected immigrants, arrangements should be made for conducting the process of disinfection upon a large scale. Properly equipped steam disinfection chambers should be provided, and these

should be under the management of individuals who have been taught the proper means of obtaining the best results from their employment.

In hospitals and in private families the same end can be obtained by the use of hot water. An ordinary wash-boiler, filled with boiling water, into which the soiled bed-clothing and underclothing can be placed *immediately that they are removed from the bed or patient*, not only serves the purpose, but serves it just as well as would a more elaborate apparatus.

The question concerning the disposal of the dead is one upon which some discussion has arisen ; and as it is of no small importance, it might be of interest to see what experiment has taught us in this connection. In his experiments upon the destiny of pathogenic bacteria in the dead body, Von Esmarch was unable to detect later than five days after death living cholera spirilla in the body of a guinea-pig that had died of the experimental form of the disease ; and as a result of experiments performed in the Imperial Health Bureau at Berlin it was found that the bodies of guinea-pigs that had died of cholera induced by Koch's method of inoculation contained no living cholera spirilla when exhumed after having been buried for nineteen days in wooden boxes, or for twelve days in zinc boxes. In a few that had been buried in moist earth, without having been encased in boxes, when exhumed after two or three months, the results of examinations for cholera spirilla were likewise negative.

There does not seem, therefore, to be any objection to the burial of the bodies, providing the interment does not take place in a locality where a spring or water-course could be directly contaminated ; indeed, on the contrary, this method of disposing of infected materials generally is second to cremation only in its requiring a longer time for the accomplishment of the same end.

Protective Inoculations.—In this period of protective inoculation it is not surprising that efforts have been made to discover means of immunifying individuals against the possible infection of cholera by means of vaccination. Conspicuous in this field of research have been Gamaleia, Pfeiffer, Haffkine, and Klemperer, but thus far little has been done to prove protection for human beings. The experiments that have

been made upon smaller animals have, in a number of instances, offered a favorable outlook, but the difficulties attending their successful employment upon human beings are, I think, too great to warrant the anticipation of their general adoption.

From what has been said, we see that the difficulties attending the destruction of the infective agent of Asiatic cholera are by no means so great as those that stand in the way of preventing its invasion through the manifold portals that are open to it. In the first instance Nature does much in the way of limiting the life-period of this organism, but often by no means enough to admit of this limitation coming into play before a great deal of damage has been done. As to the part that we can take in this direction I shall limit myself to these fundamental precautions—viz., if cholera is not already in the household, much can be done to prevent its invasion by total abstinence from all uncooked food or drink; if cholera is present, we can rest with an easy conscience if each and every evacuation, all vomited matters, and all soiled underclothing and bed-clothing are disinfected by any of the methods recommended, as soon as they are passed or removed from the patient, for we shall then know that all has been done that can be done by us as individuals in preventing the spread of the disease to those not affected.

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SANITATION AT MEETING OF AMERICAN MEDICAL ASSOCIATION.

MILWAUKEE, WIS., JUNE 6TH–9TH, 1893.

ABSTRACT OF PROCEEDINGS.

From Address of the President, HUNTER MCGUIRE, M.D., of Virginia.

SECRET AND POISONOUS MEDICINES.—I think this Association owes to the people of this country an earnest effort to stop the sale of secret and poisonous medicines. Free trade in physic is permitted, as far as I can learn, only in this country, and any quack can advertise in the reading and other columns of our newspapers his so-called patent medicines. Many of these nostrums are known to be poisonous, and of course hurtful. All over Continental Europe grocers and druggists are forbidden to sell any pharmaceutic preparations or compounds. This right is restricted to the pharmacist or apothecary, and he is often subjected to rigorous inspection, to very rigid laws, and to heavy penalties for their violation.

If each State would require the vender of any secret remedy to subject his formula to a board appointed by the State for this purpose, said board having the power to grant or refuse a license to sell, this already great and growing evil would be materially lessened or stopped.

SMALL-POX, TYPHOID-FEVER, ETC.—The police regulation of small-pox is a matter for the gravest consideration upon the part of the general Government and of the several States of the Union. Regulations, full, comprehensive, and complete, should be formulated for the prevention of its introduction from without, and its eradication wherever it appears in our land. Notwithstanding the organizations known as "Anti-Vaccination Societies," which so often send out all sorts of misrepresentations, and notwithstanding misstatements from other sources, from the time of Jenner's conclusive demonstration (in 1796) down to the present hour, vac-

cination has been growing in favor, and now the great majority of the educated classes have become convinced of its importance. Compulsory laws have been put in force in the larger number of European countries, and especially in the German Empire, where not only the army, but also the people at large, are compelled to submit to vaccination at stated intervals—once every third year being the rule for the army.

Our large and constantly augmenting population, the facilities for travel, and the disposition to use these facilities, render it imperative that we should endeavor to obtain, as far as possible, from the respective States composing our Union legislation of a uniform character upon this subject. Until this is done there will be a constantly impending danger of local, and even general, outbreaks of this universal scourge of the human family. Were it not for the municipal powers that have been granted to our leading cities, and exercised by them, this disease would be perpetually with us, and our vital statistics would groan under the burden of its polluting ravages.

A study of the causes and conditions that produce typhoid-fever, the curse of the mountain and Piedmont regions, demands the utmost industry and closest observation on the part of physicians whenever this disease makes its appearance. The great majority of writers upon this and kindred topics unfortunately reside in cities where the true type of the disease is rarely to be found, and where they are too liable to seize upon conditions that they know to be conducive to disease in general, and assign them as the active factors. Sinks, privies, sewer gas, and polluted drinking-water are the spectres that flit across the stage to deride and delude these investigators. I cannot refrain from expressing the hope that there will arise some eminent man, or more than one, in the rural regions, possessing the intuition that is akin to genius, who will be able to show with almost mathematic certainty the real circumstances and combinations upon which this malady depends. Be it germ, be it mite, or leukocyte, the result remains the same. Individual diseases with their causes are better segregated in the country, and more reliable observations ought to be possible. Jenner and Koch were country doctors.

The contagious diseases, mumps, measles, whooping-cough, scarlet-fever, and diphtheria annually carry to the grave thousands of our people, chiefly from the youths and infants, those who are nearest and dearest to us and who appeal most strongly to our tenderest sympathy. These maladies are increasing in a different ratio to the advance in population, and while moderate treatment has done much to alleviate the sufferings of these unfortunate victims, mainly through hygienic measures, still the mortifying fact is patent that their genesis is wrapped in the same obscurity that it was two thousand years ago. The germ, the malignant little parasite, we may have discovered as the source of all these troubles; but why or whence this germ? That defies our knowledge.

QUARANTINE.—One of the most important questions of the hour is that of quarantine. During the past year the apprehensions of the country have been fully aroused upon this subject, and there is every disposition on the part of the people to have such laws enacted as will render us safe against the introduction of Asiatic cholera and typhus-fever. The latter has entered one of our principal ports, and has infected a limited number of the population of the city of New York. Thanks to the efficiency of the Board of Health, it has been kept under relative control, and is now abating. The former, starting from its home in the East some two years ago, and following the track along which it has heretofore travelled, has not only reached the most frequented ports of Western Europe, but has traversed the Atlantic, and during last summer sought admission to our shores. Through a number of fortuitous circumstances, rather than by the aid of any well-ordered quarantine, we have been spared the misery of an active invasion. The disease has retreated to the farther side of the ocean, and seems to be preparing, with renewed energy and increasing activity, for a second attempt to invade us. Shall it succeed? This is the vital question that we are called upon to meet, and, if possible, to solve. The subject is not incapable of solution; but there are difficulties that beset us, owing to the character of our institutions and the organic laws under which we live. It has, on more than one occasion, been shown that the strict enforcement of quarantine laws in

America, as well as in Europe, has prevented contagious diseases from entering the seaports of a country when full and judicious measures were put into execution.

During the late war between the States, every seaport along the South Atlantic and Gulf States that was effectually blockaded was spared an invasion of yellow-fever. Even New Orleans, which, prior to that period, had been so frequently visited by this disease, was kept exempt from it through the measures resorted to for the purpose by the military commandant. Even after one case had escaped the vigilance of the quarantine officer and had taken up its abode in one of the most populous sections of the city, the disease was prevented from obtaining a foothold by prompt removal of this case to a vessel in the river, which made a speedy exit from the port. Wilmington, North Carolina, which, until the last year of the war, remained comparatively open to vessels plying between that port and the outside world, was subjected to a frightful scourge from yellow-fever, owing to its introduction from the Bermudas. Do not these facts warrant the conclusion that yellow-fever is of alien origin, and never endemic in this country? I offer this illustration to show what can be brought about when a preventive system of quarantine is scrupulously carried out. The circumstances and environment were such at New Orleans as to make it imperative upon the military officers there to keep the disease out of the city, as the army of occupation was, owing to the configuration of the country, necessarily encamped within its limits. It was an army recruited from the more northerly section of the United States, and unaccustomed to the oppressive and enervating heat of so warm a climate. Had yellow-fever once established itself, that army would simply have been annihilated, and the chronicler of the leading events of the war would have found adequate figures of comparison only in the plague of London and the Black Hole of Calcutta. These visitations come to us, however, in the majority of instances, in times of profound peace, when it is difficult to induce the authorities of the country to enact laws sufficiently stringent to maintain a judicious quarantine. In America, while we enjoy the blessings of a freedom never before equalled, the greatest enthusiast will not fail to acknowledge that our form of government has some defects

when it is called upon to grapple with questions that require the curtailment of the personal liberty of the citizen for the benefit of the people at large.

There is another drawback to the enactment of general quarantine laws. Our seacoast towns, as ports of entry, are jealous of their local and territorial trade-rights. A grand network of railroads spreads over our entire country, and the ordinary channels of trade can be interrupted and the trade diverted into new directions whenever free ingress and egress to traffic do not exist at any one of our seaports. Appreciating these facts, and ever jealous in guarding their commercial interests, public sentiment in such communities always tends to suppress the truth at the inception of an epidemic ; and even the press, usually free and outspoken on all matters in which the general public is interested, remains practically silent until its utterances cease to be news and a widespread epidemic has advertised itself. This is a matter of profound regret ; and yet so long as human nature retains its present characteristics we may always expect such causes to produce corresponding results.

To depend upon municipal quarantines for the protection of this great country from the spread of contagious diseases is to reckon without your protecting host. The selfishness of human nature, the desire for gain, the aggressions and the potency of wealth will all be brought to bear upon those in authority, and will, if possible, drive from place and power conscientious officers, who, in the discharge of their duty, fail to comply with their behests and interfere in any way with what they consider their rights and privileges. I trust that I shall not be held as animadverting too severely upon this subject. These remarks are not intended for any particular locality. What I have stated is sustained by the history of the past epidemics that have broken out in our country. No one can ever be safe so long as the local authorities at ports of entry are left as the sole protectors of the nation against the entrance and spread of epidemic and contagious diseases.

The peculiar organization of our Union of States is such as to deter those in official positions from exercising authority in any case except when the right so to do is clear and well defined. The jealous care with which the rights of the States

were guarded in the formation of the Constitution and the special declaration by amendment to it, that all powers not specifically granted to the general Government were reserved to the States; the provisions defining the rights of the Government and the reserved rights of the States have been the means of engendering more antagonisms than any other issues that have arisen under it. I need not recur to the stirring scenes that have been enacted in the United States Congress on many eventful occasions. The antagonisms referred to brought on our great civil contest, with the results that are so painfully fresh in the memories of all. It is not surprising that politicians are averse to agitating any questions that may in any manner trammel the rights of the States through laws passed by the general Government.

The trend of public sentiment, as shown by the laws enacted by Congress, and the decisions of the Supreme Court of the United States for the last twenty years manifest very clearly that the public conscience recognizes the fact that a return to old conceptions on this subject is necessary for the general good of the country. While we may admit this to be true, yet, in the particular issue we have in hand, may we not fall into very grave error by failing to perceive what is clearly our duty to the people as a whole? "The general welfare" clause of the Constitution clearly gives to Congress the right to legislate for the preservation of the health of the citizens of this country and for the prevention of the spread of epidemic and contagious diseases among them. There will be many who will cavil at this application of the clause referred to, and the attempt to enact a quarantine law of a rigid and vigorous character will meet with stout and bitter resistance.

Reared in the school of strict construction as to the rights of the States, I do not hesitate to declare that the time has at last arrived in this country when, owing to the imperative exigency growing out of our great increase in population, the facilities for travel and intercommunication, and the constant flow of immigration from all parts of Europe, all patriots representing every shade of political opinion should unite in demanding of Congress the passage of a law, strong, concise, and yet comprehensive, that will enable the Government to properly protect its citizens against disease whenever, in the discretion of its officers, the emergency may have arisen.

There is as much reason why the power of the Federal Government should be invoked to aid in repelling the advent of pestilence as to aid in repelling the advent of a hostile fleet or army. Once established, pestilence would cost our country more human lives and more money than a war with any foreign power. These remarks are made in consequence of the failure of our late Congress to pass such a bill. The measures adopted are partial and temporizing, and fall far short of the exigencies of the hour. I shall not attempt to give the details of this law, approved February 15th, 1893, known as "An act granting additional quarantine powers and imposing additional duties upon the Marine Hospital Service." Its provisions are, no doubt, familiar to you all. All of the sections relating to consular regulations abroad are everything that we could wish ; but when the act comes to be applied on this side of the water it is grossly defective. All on the other side of the Atlantic is compulsory ; all on this side permissive and co-operative. So long as the Government officers are only permitted to co-operate with States and municipal quarantine officials, just so long will the law be imperfectly executed. We must not let the matter rest here. This society should endeavor to arouse the people to a correct appreciation of their danger and of their rights and duties in regard to it, and never cease agitating it until Congress shall be forced to enact such laws as are "necessary and proper" for meeting each and every emergency.

Personally, I am not in favor of a quarantine of detention, but of a quarantine of anticipation and prevention. This is the true way of avoiding the introduction of epidemic diseases into this country. The modern system of quarantine is not a system of exclusion or even of prolonged detention ; it is based upon the application of scientific methods and apparatus. I call your special attention to the significant fact that this "system of maritime sanitation" has kept New Orleans free from yellow-fever for the last twelve years, and absolutely without interfering with commerce ; it has been pronounced by competent observers the most complete system of quarantine in the world, and it should be adopted as a model by the Federal Government for our common defence at every point where pestilence may be imported.

National Board of Health.—The importance, indeed the necessity, of a National Board of Health organization will be appreciated when it is remembered that the present laws refer almost entirely to quarantine in time of epidemics or threatened epidemics, such laws being carried into effect by the Marine Hospital Service through the Treasury Department. Every important power in Europe has its chief sanitary bodies independent of the army and navy. In this country, according to our form of government, there are sanitary duties that can and should be performed only by municipalities, and there are duties, especially in time of epidemics, that cannot effectually be performed by cities, but should be looked after by the State, and thus, in like manner, when the States are unable to accomplish what is necessary, then the National Government should do it. This is not the case as the law now stands. Two years ago, at the meeting of this Association held in the city of Washington, a bill was proposed and recommendations were made to the effect that a Minister of Health be created who should be a Cabinet officer. In the recent legislation by Congress, this bill, though pending, was entirely ignored. At the last meeting of the American Public Health Association, held in the city of Mexico, the Committee on National Health Legislation recommended the appointment of a National Health Bureau and a Commissioner of Health, who should be the *chief sanitary officer* of the United States; said bureau and commissioner (sanitary) to be independent of the medical bureaus in Washington. The law that was passed by the recent Congress was a compromise between some of the bills pending in Congress, and, owing to the necessities then existing, the legislation was hurried, and, although in some respects in advance of what had existed before, still to the sanitarians and those interested in the sanitary welfare of the nation it is far from being satisfactory.

I learn that there will be an organized movement to secure legislation by Congress on the lines indicated, and I would respectfully suggest that a committee be appointed from this Association to co-operate with the committee appointed by the American Public Health Association and committees of other important bodies interested in securing the legislation needed.

THE CHOLERA IN INDIA.—ABSTRACT OF AN ADDRESS BY ERNEST HART, EDITOR OF "BRITISH MEDICAL JOURNAL."

RELIGIOUS pilgrimages are a fruitful means of spreading cholera in the East. In 1866 thirty thousand pilgrims died of cholera at Mecca. And here let me mention one of the customs of that pilgrimage which goes far to explain the intensity and the fearful mortality which attend any outbreak of cholera among the Meccan pilgrims. At a given period the pilgrims stand naked in turn by the holy well; a bucket of water is poured over each man; he drinks what he can of it, and the rest falls back into the well. The water of this well has been analyzed by an English chemist, Dr. Frankland; it is fearfully polluted with abominable contaminations. In 1866, within a few days of the ceremony, the road for twelve miles to the foot of Mount Ararat was thickly strewn with dead bodies.

In a report in June, 1891, Dr. W. J. Simpson, an able and energetic health officer of Calcutta, gave an interesting account of two large pilgrimages which he personally witnessed in that year—one in the endemic area of Bengal and the other in the non-endemic area or north part of India. The first of these pilgrimages was the Ardhodoya Jog, which is held at Calcutta and other sacred places near Calcutta, at rare intervals of twenty-seven or twenty-eight years. The purity to be obtained by bathing in the Ganges during this festival is exceptionally great, and therefore the gathering of pilgrims at the several bathing shrines was, on its own merits, a very large one. Kalighat, where the gathering in question took place, is in the suburban area of Calcutta, on Tolly's Nulla, a small tidal creek which is held to be more sacred than the Hooghly. The nulla can be waded across at low tide, but it is the receptacle of unspeakable filth of all kinds. After describing the unsanitary arrangements of the neighborhood, Dr. Simpson remarks that "without a good water supply, or drainage, or proper means of disposal of the excreta and sulliage, with crowding together of huts and houses irregularly placed, and with the filthy tidal nulla, which is practically the sewer of the district, and with numerous polluted tanks, Kalighat, it may be surmised, is at no time a healthy spot, and at all times a danger to pilgrims." On the occasion in

question at least one hundred and fifty thousand people came into Calcutta in the first and second week of February, and to describe the crowding which occurred in the nulla on the festival day is difficult. Dr. Simpson performs this task very graphically by appending to his report a photograph which he himself took on the morning of February 8th. The crush is seen to be very great, and it is marvellous that no accidents happened ; the tide is low, and the bathers, even in mid-stream, have not the water much above their knees. A collection of boats, extending as far as one can see, is so great and close together that only occasional glimpses of the water are to be obtained, and these boats are crowded with men, women, and children. Dr. Simpson gives details of an outbreak of cholera which occurred among these people, as many as fifty-one cases appearing on February 11th. The pilgrims had to be soon dispersed, and though this dispersal checked a larger outbreak at Kalighat, which would have only widened its circle afterward, it could not prevent those already infected from suffering on their way home. Consequently, at some of the principal railway stations, sick people had to be taken out of the trains ; passengers by boat died on their voyage, their bodies being thrown overboard ; while travellers on foot were picked up dying and dead on the roads.

Dr. Simpson's description of the great Kumb festival, which occurs once in twelve years at Hurdwar, is also very graphic, and photographs taken by Dr. Simpson at the festival of 1891 —copies of which I have before me—show the sacred pools and the approaches to them to be hidden by a mass of semi-naked human beings. The pollutions to which the sacred pool is exposed on these occasions are indescribable. There is not only the washing of the naked fakirs, who cover themselves with wood ashes as their only clothing, and the general bathing of the pilgrims, who are not all in the cleanest of clothes—several, moreover, on the occasion in question being seen bathing with skin diseases upon them—but the ashes of deceased relatives, inclosed in little red bags, are brought from the different homes of the pilgrims and thrown into the pool. Can it be wondered at that, when cholera cases have been among the pilgrims, disease and death should have spread broadcast ?

Reverting again to the sanitary administrations of India and the difficulties to be encountered, I fully recognize that very much has been done in the way of sanitary reform under English rule. This was shown by Surgeon-General Sir W. Moore, in an interesting paper read by him before the International Congress of Hygiene, which met in London in 1891 ; but at the same congress the authors of numerous other papers showed the amount of sanitary work still urgently waiting to be done in India. One and all of those authors placed the need for better water as the most pressing want throughout India, especially in the villages, which contain 95 per cent of the people of India.

Greater energy and more systematic administration are much needed in regard to the sanitation of India, and England's imperial responsibilities in this matter are very heavy, not only to the native races under her protection, but to civilization at large. At the International Hygienic Congress in Vienna the remark was constantly made, "You English have, by your sanitary improvements, prevented cholera from gaining a foothold in England ; why do you not attack it in its birthplace, and prevent it springing into life in India?" And the same question has more recently been asked by Dr. Talafuss, of Tiflis, and by M. Monod, the Director of the Public Health Department of the French Ministry of the Interior, in his work on "Cholera in Finistère." We may well closely question ourselves why we have not succeeded in carrying further than we have done the great work of improving the sanitary circumstances of Indian populations. It has not been, as Sir Douglas Galton has pointed out, for want of knowledge. The following scheme for a new public health service for India has been drawn up by an eminent medical officer in India, who has himself long been engaged in sanitary work and organization. I commend it as a useful suggestion to our Indian Government.

1. An imperial sanitary department attached to the Government of India.

2. A provincial sanitary department attached to each of the provincial governments, such as Bengal, Northwest Provinces, Punjab, Madras, Bombay, Central Provinces, etc.

3. A local sanitary department attached to each municipality, district board, etc.

1. The imperial sanitary department should be administrative and scientific, and quite distinct from the sanitary department of the army. It should consist of: (1) The sanitary commissioner with the Government of India; (2) deputy sanitary commissioner; (3) a medical statist; (4) veterinary commissioner; (5) sanitary engineer; (6) a minister of health, having a seat in viceroy's council, as president. Scientific agents: Laboratory with trained experts. Duties: The advising of the viceroy and council on important health matters, either initiated by the imperial sanitary department, or referred to it by the local governments; the collection and publication of information as to epidemic disease existing in India and in other countries; the right of asking from provincial governments what they propose to do, or have done, in checking or inquiring into diseases affecting man, animals, or agriculture in their provinces; the arranging that all administration reports shall be drawn up on a uniform plan for ready reference; the acquiring of all information regarding the movements of pilgrims, coolies, and emigrants, and the advising the provincial government, and requiring the latter to take proper precautions; the consideration of new sanitary laws, etc.

2. Provincial sanitary department, to consist of the following sanitary officers appointed by the local Government: (1) Sanitary commissioner; (2) assistant sanitary commissioner; (3) sanitary engineer; (4) a president, who should be a high officer in the civil service. Travelling agents: Deputy sanitary commissioners or inspectors, veterinary surgeons, deputy sanitary engineers, as may be required. Scientific agents: Trained professors and assistants in Government laboratory for bacteriological, chemical, agricultural work, etc., and general sanitary investigations requiring to be done in laboratory. Duties: To control local authorities; to institute special investigations at any particular spot on any particular subject; to make by-laws and amend sanitary laws; to investigate diseases of men and animals, and study agricultural pests, etc.; to analyze waters, etc.

3. Local sanitary departments, to consist of municipal commissioners or district magistrates, with civil surgeon when obtainable. Executive agents: A health officer, attached for

one or more towns; an engineer in similar position, and a sanitary staff for each place as required. Duties: Conservancy, water supply, building regulations, drainage, registration of births and deaths, vaccination, stamping out of infectious disease, and informing provincial authority by weekly reports as to the prevalence of cholera, small-pox, or other dangerous disease.

REPORT OF SPECIAL COMMITTEE APPOINTED TO PETITION CONGRESS TO CREATE A DEPARTMENT AND A SECRETARY OF PUBLIC HEALTH.

Mr. President: At the last meeting of the Association, in Detroit, in June, 1892, your committee reported a hopeful progress of our appeal to Congress to establish a department and a medical secretary of public health. Our petition with an accompanying bill had been introduced in both houses and referred to appropriate committees. A full hearing was given to the chairman of your committee before those committees. The chairman of the Senate Committee, while willing to extend the powers of the existing quarantine office, as administered by the Marine Hospital Service, did not think it possible to get from Congress an appropriation for its establishment under the existing circumstances.

The members of the House Committee seemed disposed to favor such a department; the chairman of it saying that he thought that the health of the people was certainly of as much consideration as that of cattle, which was so expensively investigated by the agricultural department. But the first session of the fifty-second Congress adjourned and no report had been made by either house.

In the mean while the development of cholera in Europe and the menace of its transportation to our shores, led to a renewed activity and grant of power to the quarantine office that made it impossible to secure any further action of Congress on the proposition to establish a department of public health.

Your committee entertains most favorable opinions in regard to the activity and intelligence which is displayed by the Marine Hospital Service for the preservation of our seaports from epidemics of foreign origin, and for its regulations to

prevent their transportation from State to State along our commercial lines ; but it does not seem reasonable that all the benign measures of preventive medicine should be administered by a single organization whose functions relate to so limited a field, in comparison with one which relates to the demography and hygiene of the cities, towns, and agricultural regions of our country at large, and the supervision of which would be far more intelligent and effective by a medical secretary of state than by the Secretary of the Treasury.

The medical profession of the United States has nothing to ask of Congress for its own aggrandizement, but simply pleads for the welfare of the people, with whose social existence it is more intimately acquainted than any other class of citizens ; that our knowledge and duties apply to everything connected with their employments, their habitations, food, mental and moral development ; that while the fearful yet preventable diseases which desolate their homes give us large revenues, yet the obligations of our beneficent profession compel us just as earnestly to attempt to destroy the causes of sickness as to save them from its ravages. Therefore we made an earnest appeal to Congress to organize a comparatively inexpensive department in the Government that would be able to give aid by concerted action with the State boards of health in the detection and destruction of the germs of deadly diseases that infest the air, water, and food not only in our coast cities, but in the homes of our agricultural classes.

The organism which is called medicine, like every other product of man's constructive genius, is striving to attain perfection, and to accomplish this it should be sustained in all its scientific undertakings by the co-operation of national and State legislation and by the people at large, for whose health and happiness all of its efforts are put forth to prevent disease.

The medical profession is worthy of the distinction we seek for it, because it is a learned profession. Its methods of practical research are the same as those employed by lawyers, engineers, and machinists. While it has not the quantitative precision of mathematical investigations, it has the qualitative precision that attaches to all sciences of observation, and the opinions of physicians in a given case are of as much value as those of lawyers, ministers, statesmen, architects, and en-

gineers. The clinician proceeds in his investigations regulated by the canons of logic ; indeed, the laws of logic which have guided the world of thinkers for more than twenty centuries were invented by a physician.

The question may arise whether such a department would subserve the interests of any particular school. We reply that amid all the apparent disparity in medical practice there is one true severe unity, and to attain this all true physicians are continually striving. With the advance in the way of higher education the differences in modes of treatment will gradually disappear. There is no disputation in medical science in regard to anatomy, physiology, pathology, chemistry, physics, or preventive medicine. The general modes of practice will become gradually unified.

We now insert a copy of the bill which was introduced in both houses of the last Congress, and which still remains on the files of the committees to which it was referred :

A Bill to Establish a Department of Public Health. —*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That there shall be established a Department of Public Health. There shall be appointed from civil life by the President, by and with the advice and consent of the Senate, a Medical Secretary of Public Health, who shall be intrusted with the management of the Department herein established. He shall be paid an annual salary of ——. He shall, with the approval of the President, provide suitable offices for the Department, and shall employ such assistants and clerks as may be necessary.

Sec. 2. That it shall be the duty of the Department of State to obtain from consular officers at foreign ports and places all available information in regard to sanitary conditions of such ports and places, and transmit the same to the Department of Public Health ; and the Secretary of Public Health shall also obtain, through all sources accessible, including State and municipal authorities throughout the United States, weekly reports of the sanitary condition of ports and places within the United States, and shall prepare, publish, and transmit to the medical officers of the Marine Hospital Service, to collectors of customs, and to State and municipal health officers and authorities, weekly abstracts of the consular sanitary re-

ports and other pertinent information received by said department. The said department also shall, as far as it may be able, by means of the voluntary co-operation of State and municipal authorities, of various general and special hospitals and sanitariums, of public associations and of private persons, procure and tabulate statistics relating to marriages, births, deaths, the existence of epidemic, endemic and other diseases, especially those of a degenerative character, such as malignant growths and affections of the circulatory, respiratory, secretory, and reproductive organs, and data concerning the fruit of incongruous marriage and transmissibility of insane, alcoholic, syphilitic, nervous and malignant types of constitution. He shall also procure information relating to climatic and other conditions affecting public health, especially in reference to the most favorable regions in the United States for the cure or relief of the chronic diseases of the several organs of the body, especially of consumption. He shall also obtain information in a sanitary point of view of the health and comfort of the laboring classes. He shall seek through the State boards of health information in regard to the healthiness and comfort of public school houses. He shall, so far as he can, further collect investigations in regard to the common diseases of an inflammatory and febrile character that prevail among the people. He shall co-operate with State boards of health, the signal service, the medical departments of the army, navy, and marine hospital service, and unify and utilize their work so as to make the department of public health a repository of the most important sanitary facts that concern the public comfort. Besides the reports of the state of public health, which he shall make from time to time, the Secretary of Public Health shall make an annual report to Congress, with such recommendations as he may deem important to the public interests ; and said report, if ordered printed by Congress, shall be done under the direction of the Department. The necessary printing of the department shall be done at the Government Printing Office, upon the requisition of the Secretary of Public Health, in the same manner and subject to the same provisions as that of other public printing for the several departments of the Government.

SEC. 3. That the Medical Secretary of Public Health shall

frame rules, under the direction of the President, which shall serve for the instruction of consular officers of the United States and of the medical officers serving at any foreign port. In compliance with these rules every master of a vessel destined for a port of the United States shall be furnished with a certificate containing a detailed statement of the inspection of the vessel, cargo, crew, and passengers, and of the sanitary measures carried out, at the expense of the vessel; or if such measures are not carried out, instant warning shall be transmitted to the Medical Secretary of Health, who shall immediately notify the quarantine authorities of the port of destination.

SEC. 4. That the Medical Secretary of Public Health shall make investigation, both in the United States and, if necessary, in foreign countries, into the nature, origin and prevention of contagious and epidemic diseases, as well as the cause and conditions of particular outbreaks in disease in the United States, and shall publish and distribute documents relating to the prevention of disease.

SEC. 5. That the President is authorized, when requested by the Medical Secretary of Public Health, and when the same can be done without prejudice to the public service, to detail officers from the several departments of the Government for temporary duty, to act under the said Department of Public Health to carry out the provisions of this Act, and such officers shall receive no additional compensation, except for actual and necessary expenses incurred in the performance of such duties. When a detail of such officers cannot be made, the Medical Secretary of Public Health, approved by the President, may employ such experts, and for such a time and in such manner as the funds at the disposal of the Department may warrant.

SEC. 6. That to defray the expenses incurred in carrying out the provisions of this Act, the sum of —— dollars, or so much thereof as may be necessary, is hereby appropriated, to be disbursed, with the approval of the President, under the direction of the said Secretary of the Department. That this Act shall take effect sixty days after its passage, within which time the Medical Secretary of Public Health may be appointed.

SEC. 7. That an Act entitled, "An Act to prevent the introduction of contagious and infective diseases in the United States, and to establish a national board of health," approved March 3d, 1879, and all other acts and parts of acts conflicting with the provisions of this Act are hereby repealed.

It will be seen in the terms of the above bill that a secretary of public health would represent the medical consciousness of our Government, and he would be one to whom we could all look for the exploitation of measures that will direct continuous scientific and collective investigation in regard to endemic, epidemic, and all diseases; the enlightenment of the people in regard to sanitary ways of living; the dissemination of information respecting the most favorable places of residence for those afflicted with such chronic diseases as asthma, rheumatism, neuralgia, and consumption; the examination of food and drink and medicinal springs; the collection and tabulation of vital statistics at large, and in various localities, such as in the congested areas of our great cities and among the various races which are so rapidly populating our country; the influence of different employments upon the health of working people—men, women, and children; the degeneration of the muscular, nervous and mental constitutions through excesses of any kind, and the transmissibility of vicious types of constitution to descendants. He would be able to co-operate with State boards of health, the signal service, the medical departments of the army, navy and Marine Hospital Service, unify and utilize their work, and thus make the Department of Public Health the repository of the most important facts that concern the welfare and comfort of the people, and his duties will steadily grow broader and stronger in adaptability to public needs. In fine, the creation of such a department by Congress will be a declaration that the health of the people is a supreme law.

The complemental value of this new department will be an increased rank and dignity of the medical profession among the people, a more prolonged and thorough culture and practical training of students, until at length the doctor shall be recognized as a citizen possessed of the highest attainments for the well-being of society.

In reporting the failure of your committee to procure the

sanction of Congress in this first effort to establish a department of public health, there should not be felt any discouragement of final success ; indeed, we think scarcely any one believed it to be possible to gain our point, but as an outcome of several years of well directed effort and supported by a powerful constituency.

Although several thousand appeals for assistance to all points of the land were made, yet the responses amounted to less than one thousand, and these came mainly from the regions in valleys of the great western rivers and the Pacific coasts. The apathy that exists along the eastern coasts is truly surprising. Special appeals made to colleges and great societies elicited only a few replies. But we were comforted by approving votes from the American Public Health Association and the State boards of health and State medical societies of Pennsylvania, Ohio, Kentucky, Tennessee, Georgia, Louisiana, Missouri, Illinois, Indiana, Kansas, Michigan, Texas, and California. The replies from individuals in answer to our circular were warmly in favor of the project, and assurances were given that the representatives and senators of Congress would be urged to assist the bill to its adoption.

The difficulties attending the introduction of bills into Congress are very serious. After a first reading they are referred to committees, where the delays are great ; to be successful it requires a constant watchfulness of their progress, and members of a committee grow weary of pleas for a favorable report. From the experience we have gained in our efforts to secure a consideration of our bill we are led to believe that the best course to pursue will be in an appeal to President Cleveland to recommend in his annual message the establishment of a department of public health. The President in his address in New York City, at the dedication of the new Academy of Medicine, so extolled the dignity and public worth of the medical profession that we feel much confidence that he will favor our project, if it be presented to him by a committee of well-known physicians and surgeons who would represent the great divisions of the Union. Congress would then be obliged to seriously consider the subject, and if the profession in all parts of the country shall press a favorable action by their representatives, there cannot be a doubt of a success-

ful issue. It is a mighty, and we may say an irresistible force that can be brought into play to accomplish this movement. There are at least seventy-five thousand members of the regular profession in the United States, and who are generally men of large influence, and who can prove to the people that this is a measure of the utmost public utility, and without any relation whatever to partisan politics. Thus they will be led to demand of their congressmen its adoption.

In conclusion, we submit to the American Medical Association for its adoption the following resolutions :

Resolved, That this Association will continue its efforts to secure the creation of a department and a secretary of public health at Washington.

Resolved, That the President of this Association appoint ten members, representing different regions of the Union, who shall prepare as early as may be an appeal to His Excellency, Grover Cleveland, President of the United States, to lay before Congress in his next annual message a recommendation that a department and a medical secretary of public health is a measure that is calculated to promote in a large way the public welfare.

Resolved, That this petition shall be presented, as far as may be possible, by the committee in person.

Respectfully submitted,

C. G. COMEGYS,
WILLIAM B. ATKINSON,
N. S. DAVIS,
For the Committee.

The report was adopted by the Association.

(*To be continued.*)

PROCEEDINGS OF THE AMERICAN MEDICAL EDITORS' ASSOCIATION.

THE event of the meeting of the American Medical Association at Milwaukee, Wis., June 5th, 1893, was the presence of Mr. Ernest Hart, the distinguished editor of the British Medical Association. Mr. Hart made an excellent impression by his addresses before the Medical Editors' Association and in the general session of the Association. The address before the

editors sparkled with wit and wisdom. It was eloquent, thoughtful, and brilliant with epigram. Mr. Hart himself is of small stature, with a shrewd, kindly face, active in his movements and quick of speech. He creates the impression on those who first meet him that he has long been acquainted with them. He grasps your hand and says: "Ah, yes, of course, I know your name very well. I see it often in the journals." The newly introduced then goes off, feeling that his reputation is established. Mr. Hart is probably a successful politician at home. He certainly would be in this country.

The address should be studied with care by every editor of a medical journal in this country and its wholesome lessons laid to heart.

It would be ungracious to pass without remark the other thoughtful addresses at the editors' meeting and the brilliant speeches at the banquet. At the latter function Dr. Culbertson presided with grace and dignity, and Governor Peck, of "Bad Boy" fame, Dr. Hare, and others were humorous as well as incisive. Altogether the meeting was the best in the history of the Association of American Medical Editors.

In the general session of the association Mr. Hart made an excellent address on "Cholera." While it contained nothing new to the sanitarian, it was an effective summing up of our present knowledge, and should be read by every physician as well as the public at large.

The work in the sections was about up to the average. In the section on State Medicine, which was very poorly attended, the most important subject was the final report of the Committee on School Hygiene. This paper which was prepared by Dr. D. F. Lincoln, the Chairman, and revised by every member of the committee, is the most exhaustive contribution on this important subject accessible to the English reader. It should be in the hands of every teacher and school official in the country.

The Chairman of the section for next year is Dr. George W. Stoner, of the Marine Hospital Service, and the Secretary, Dr. Shepherd, of Brooklyn. Dr. George H. Rohé, of Catonsville, Md., was selected to deliver the general address on State Medicine at the next meeting, which will be held in San Francisco in May, 1894.

TYPHUS FEVER.

TO WHAT AN EXTENT IS THE MEXICAN TYPHUS A COMMUNICABLE DISEASE?*

By Dr. Jesus Chico, Guanajuato, Mexico.

Among the principal pirexies which call the attention of the practitioner in the Mexican Highlands, the first place is undoubtedly to be given to an ailment of the family of the typhous diseases, thought by some of our best medical authorities to be wholly different from typhoid-fever and from the Irish typhus, although it has with the latter the most striking likeness. Perhaps a brief sketch of its principal clinical features will be of some use to those of our distinguished guests who are not yet acquainted with it.

The beginning of the disease is generally rapid—some hours of discomfort; a chill, seldom a shivering; a continued fever; violent headache; often at the second or third day bleeding from the nostrils, mostly moderate; at the fourth or fifth are noticed some red spots, like those of measles, in the upper part of the belly, the lower part of the chest and the back. These spots spread throughout the body, with exception of the figure, where they are seldom seen. They fade gradually away, becoming petechial in some not unfrequent cases.

In the mean while the temperature increases rapidly, reaching its apex in the second day—generally 40° C. or thereabouts—and decreasing in favorable cases from the thirteenth day to the sixteenth, but mostly ending at the fourteenth in crisis or in lysis.

Although there are epidemics in which we notice frequent diarrhœa, generally speaking, there is rather constipation, often tenacious.

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* Read at meeting of American Public Health Association, Mexico, November 30th, 1892.

The rapid loss of corporal vigor and the numbness of mental powers justify more than amply the name applied to this disease, inasmuch as *typhus* is synonymous with *torpor*.

If things are to take a fatal course, we observe frequently signs of meningo-encephalic inflammations, bulbar irritation and paralysis, cervical meningitis. The *post-mortem* examinations confirm the symptoms noticed intra-vitam as the produce of inflammatory processes in the brains, bulb and upper part of the spinal cord. Such cases constitute the ataxic, malignant form of the disease.

The adynamic variety consists chiefly of the cases of adipose degeneracy of the heart, in which, when the fever is over, the patient ends in a state of hypothermic collapse, with protracted agony.

I think that this short description indicates sufficiently a strong resemblance with the Irish or exanthematical typhus. So striking is the likeness, that if we read, for instance, the chapter on typhus, written by Thoinot in the second volume of the comprehensive work, now edited in Paris, under the direction of Charcot and Bonchard, we could easily believe it was a description of our typhus and nothing else.

So if I have spoken of the ailment in question as a distinct disease, it is on grounds which, I fear, will not appear scientific enough. Nevertheless, I feel myself bound to explain and in a certain way to sustain them.

First, though I may be unfortunate in holding to the discredited principle of authority, the *magister dixit*, I will bring forward the opinion of Dr. Miguel F. Jiménez, our old clinical teacher. Those who knew him and learned to appreciate the acuteness of his observation, the soundness of his judgment, and the vastness of his medical learning, will, no doubt, easily forgive me if I bring forth, if not as an argument, at least as a strong suspicion of the non-identity of the Irish and the Mexican typhus, the fact that when so able a man, who saw in Europe so many patients of the first, would endeavor to establish the second as a distinct ailment, calling it *tabardillo*, from a disease of that name which ravaged our country under different appellations—that being one of them—and was believed by him to be the same as the kind of typhus we generally observe.

Nevertheless, as I have already stated, so strong is the like-

ness we notice between the descriptions of the Irish typhus and the clinical image we observe in the patients of our typhus, that I should not have hesitated long to believe that our dear teacher had committed one of those errors from which no man, however able, is free, when he spoke of the *tabardillo* as an independent entity, were it not for a circumstance which constitutes the main body of my lecture and of which I am going to speak.

The first which is to be noticed, when reading the paragraphs on etiology in a description of the Irish typhus, is the high contagiousness universally attributed to that disease. We read, for instance, in Niemeyer, that if a patient of typhus was brought into one of his wards, the occupants of the neighboring beds caught this disease, which spread from bed to bed till a proper isolation put an end to its diffusion. Fauvel gives, for a single month, the terrible number of 1235 internal cases in the hospitals of Constantinople, the whole number of patients being 2848.

These figures are eloquent enough, and prove satisfactorily the contagiousness of the Irish typhus ; but with the greatest certainty such is not the case with the typhus observed in the Mexican highlands.

The first circumstance that struck my mind during the period of my medical studies was the difference between the above expressed facts—which I read in the treatises on Irish typhus—and what I witnessed every day in the hospital in which I received my clinical instruction from 1872–76 (Hospital de San Andrés). There, without discrimination, the patients of typhus were mingled with patients of every description, and nobody blamed that practice, because it never had given rise to internal epidemics. So striking was this fact, that one of the professors of our medical school, Dr. Ignacio Torres, distinguished for the soundness and originality of his ideas, not less than for the want of power of expression, used to argue against the belief of the contagiousness of our typhus, saying, "*Our typhus is not contagious, not even with a cloak,*" alluding to his eternal wearing of a cloak, and meaning that if the germs of the disease could be gathered from the vicinity of the patients suffering from it, he could not have failed to catch them in the folds of his respectable and large cover.

Notwithstanding that, everything I witnessed was leading me to the belief that in their respective contagiousness laid the principal difference between the Mexican and the Irish typhus, I contrived to strengthen my own judgment and to make myself believe that if the inmates of the hospitals did not catch the typhus from their neighbors who had brought it to the wards, it was because the repeated epidemics had conferred upon the inhabitants of the City of Mexico what the Germans would call a *Durchsenchungsinmunitat*, an expressive word, whose exact translation I confess myself unable to render.

In 1876 I arrived in Guanajuato, my native town, where I have since stayed, and witnessed as a practitioner the first epidemic of typhus; and, to tell the truth, the difficulties attending the beginning of professional work prevented me from devoting sufficient attention and thought to this matter, and it was not till 1884, in the second epidemic, when, feeling more at home, the old idea which slumbered in my mind began to take strength; and reflecting that I had in Guanajuato a field particularly favorable for observation and study of this question, I purposed to contribute in the measure of my powers to the solution of the same, endeavoring to find out to what an extent the Mexican typhus could be called a communicable disease.

As I have just stated, Guanajuato is in uncommonly favorable conditions for a study of the present subject. The typhus, far from being endemic, disappears during protracted intervals, amounting to more than two years between two epidemics. In this interval there is no lack of sporadic cases, which are one of the best materials for observation. Moreover, there is among the inhabitants a close relationship, arising out of the quiet life of this town, which enables the observers to trace out the origin and results of the greater part of the cases.

Once I had made up my mind to pursue this study, it only remained to choose the best method to attain a solution as accurate as possible. With this purpose I began to preserve a written report of all the cases in which I could obtain reliable information, in order to have at hand a stock of ample material. So, since May, 1884, till October of this very year,

I have collected data respecting 432 patients, not only of those who called me to be their medical attendant, but also of every patient from whose family or physician it was possible to gather information.

In order to present the data in the best possible way, to show the result of my inquiry, I put them in the shape of a kind of tabular statement, which I have the honor to submit to your attention.

I.—1.	Total number of cases	432
2.	Of these that had previous communication with another case of typhus	38
3.	Percentage of patients who had such a previous communication (round number)	9%
4.	Percentage of patients who had no previous communication	91%
II.—1.	Patients with previous communication	38
2.	Among these the disease began *from one to four days* after the communication in	11
3.	*From four to eight days in*	8
4.	*From eight to twelve in*	8
5.	*From twelve to sixteen in*	3
6.	*From sixteen to twenty in*	2
7.	*From twenty to twenty-four in*	1
8.	*From twenty-four to twenty-eight in*	5

In 185 cases out of the 432 whose data I could gather, it was possible to obtain information about the lot of their attendants respecting the communication of the disease. Constant questioning about the state of health of these attendants, lasting three months at least after the termination of the attended case, enable me to judge this question from an inverse point of view ; and although in the rest of the cases I could not obtain information, because they were people with whom I had no frequent intercourse, I think that the above number (185), representing 43 per cent of the whole sum, permits us to draw conclusions through analogy. Well, then, the persons who attended those patients behaved themselves with a self-denial whose heroism nearly amounted to sheer imprudence. Without any precaution at all, or with mere nominal care, they handled the patients, their linen and furniture and their

dejections. They spent many long hours with the patient's head leaning on their bosom, caressing him as usual, and, let it be said in praise of the educated class of Guanajuato—among whose members I beheld the largest portion of these instances—when they acted so it was under the belief of the possibility of the contagion. I shall present the result of this part of my inquiry in the following shape :

III.—1.	Average of kinsmen, friends, and servants who attended the 185 patients recorded (number very near to exactness).....	8
2.	Total number for the 185 patients.....	1,480
3.	Persons who, out of these, caught the typhus during or after their nursing.....	21
4.	Percentage of attendants attacked.....	1,041%
5.	Percentage of non-attacked attendants....	98,959%

Let us consider now this question under another aspect. There is a remarkable relationship between dwellings and typhus. I do not mean the abodes of our poor low people where agglomeration, dirt, and bad food produce an inextricable entanglement of causes, where it is impossible to discern or discuss anything clearly—I mean the houses of people who can be called at least *well-to-do people*, to those dwellings where the room formerly occupied by a patient and the chambers near to it are thoroughly cleansed and are either papered anew or have their walls scratched and whitewashed. Perfectly well known in Guanajuato are such houses, where we find frequent cases of typhus. Out of them I will speak, first of all, of the house which is immediately after the residence of the Administrator of the General Hospital, where, in the last decennium, we have noticed at least 15 cases ; the house which is on the corner of the Estrella Lane and Palace Row, with 6 cases in the same period ; the house at the bottom of the Plazuela de los Carcamanes, now fortunately a heap of rubbish, where every family who dwelt in it had in its members a case of typhus. Paying attention to that circumstance, I inquired from each patient if he could be aware if his dwelling had been formerly visited by typhus. As was to be expected, poor people who often change from town, or at least from suburb, losing so from sight their acquaintances, and who

only think of earning a hard livelihood, could not answer any questions in the majority of cases. It was not the same with well-to-do people, with whom my inquiry was particularly fruitful, and I found out of the total number (432) 64 patients dwelt in houses where formerly there had been some patients suffering from typhus. No doubt that if I could have gathered more information this number would have been larger. Such as it is, I present it in my last numerical table :

IV.—1. Total number of cases..... 432
2. Out of these, dwelt in houses formerly haunted by typhus..... 64
3. Percentage (round number)..... 15%

Let me now discuss with the required conciseness the considerations that arise out of the presented data. In doing so, I shall examine the same objections which I at first proposed to myself when I began to reflect upon this subject. Perhaps some of them will be such as on which some of you would differ from me, in case you deign to pay attention to my paper.

The majority of the patients, when being questioned about their having had a previous communication with some other patient, answer negatively. Almost always they impute their ailment to a sudden cooling. They claim to have been wet through by the rain or by water thrown out accidentally from some house ; sometimes they have gone out without precaution from a warm apartment to the cold air, or they have stayed long in a draught. Many know not what to ascribe the cause of the illness to, and, as the first tabular statement shows, 91 per cent have been taken sick without having seen another patient. Well, then, do we not deal here with a great number of cases of indirect contagion ? This contagion could have been carried by an intermediate person, who might have attended a patient and with whom the new patient might come into contact unawares. I would say to that, as I said to myself some time ago, that, first of all, the families and acquaintances of the physicians should be among the most numerous victims, if this way of contagion could exist. Does this really happen ? I address myself to physicians, and I am sure that

everybody will answer that they have had the misfortune of carrying home scarlet-fever, measles, small-pox, and other minor ailments, *but not typhus*, thank God! The rest are more than sufficient to make the physician repent often of his calling. In the second place, it would be the most singular thing if the immediate attendants were spared by the sickness, as a rule, and that those who have only an indirect contact with the patients were its preferred victims.

The physician is rarely attacked. In Guanajuato, during a period of twenty years, only two have caught it, and that in the midst of an epidemic; while in Prague, during a single epidemic of Irish typhus, *twenty* physicians contracted it; and in the Crimean War, among *four hundred, fifty-eight* died —a number indicating a larger number of patients.

Thirty-eight are the cases recorded in which the patients had previous contact with typhus. Apart from its etymological meaning, contact is contagion. Allow me to discuss this subject as rapidly as possible. In the first place, let us consider the 27 cases in which the ailment began in the twelve days which followed to the communication with another patient. Out of those cases, *twenty-one* have been attacked in houses haunted by typhus; every one of them lived with the former patient, partaking of the same air, the same water, and identical food. Methinks these cases are rather serial infections, sometimes even simultaneous. Let us take, for instance, the little epidemic circumscribed to the Vecindad de las Animas (*Vecindad* is a kind of building for several families, each having apartments of one or more rooms, called *viviendas*). On September 14th, in the first apartment, a woman begins to be indisposed; she was a member of a different family. At the first chill she goes to her own home, walking by herself; in the same apartment two men get sick on the 15th, and a child on the 16th; in the mean time, in the other *viviendas*, and without mutual intercourse, four persons are attacked.

Do these cases indicate contagion, or, rather, simultaneous infections? If contagion, what becomes of the incubation believed to be of nearly twelve days? I think there is no exaggeration in sustaining that those attacked before twelve days have elapsed after the communication are the victims of an

infection developed more slowly than that of the first case, rather than the victims of contagion ; and methinks that the fact that the majority of these cases have fallen in houses frequently visited by typhus prove rather for infection than for contagion.

There is a balance of eleven cases in which this sickness began more than twelve days after the communication. Are they to be considered cases of undeniable contagion? I do not wish to appear extreme in my ideas nor abusing of the arguments of probability, but I cannot defend myself from the thought that these are cases of infected persons who came accidentally into contact with another person previously infected. When I reflect that the majority of the patients from whom I have gathered information have acquired the ailment without any previous communication, I cannot but think that those who fell after such communication would have fallen anyhow without it.

I shall say only a few words about the statement relating to the attendants of the 185 patients recorded in it. First, I am quite sure that when I reckon the average number of attendants to be *eight*, rather than overrating, I underestimate that number. Everybody who knows the warm heart which is proper of the educated class of the people of Guanajuato, and their readiness to offer assistance to the families who have a patient of typhus among its members, will give me full credit. Secondly, it could be believed that there is contradiction in the data I present, because in the second tabular statement I speak of 38 attacked with previous communication, while in the third I reckon with 21 attacked attendants. This difference originated only by the way in which I collected my data.

Sixty-four, according to my inquiry, got the typhus in infected dwellings. Out of them the majority are sporadic cases, which suggest to my mind some reflections, stated briefly as follows : When we notice one case of small-pox, scarlet-fever, or measles, we notice many more cases immediately afterward ; the first case observed was but the beginning of an epidemic. In Guanajuato at least we never see sporadic cases of the above-named diseases—all the cases observed are epidemical. In this we know principally the emi-

nently contagious character of those ailments. Well, then, if our typhus had any etiological similarity with them, could we observe sporadic cases? The existence of such cases is, for me, one of the more important reasons to believe that in the etiology of Mexican typhus infection predominates over contagion. If the latter was predominant, every sporadic case would give rise to an epidemic, unless special precautions were taken against its diffusion, and such precautions are never taken.

Distinguished guests and dear countrymen, let me finish. Perhaps, in contending against an exaggerated idea of the contagiousness of the Mexican typhus, I have acted as the well-known drunkard who, riding, inclined to the right, and told to take an erect posture, inclined his body to the left. If so, I do not doubt that your illustration will correct my ideas. In such a hope I end here with this proposition :

The Mexican typhus is rather infectious than contagious.

COROLLARY.—*The endeavors of the authorities and private persons must be directed to the improvement of the sanitary conditions of dwellings and towns, rather then spent on the isolation of patients.*

SERVED HIM RIGHT.—A man stepped into a grocer's shop to make a few purchases. While the clerk was weighing the goods the customer could not resist the temptation of treating himself to a piece of sugar which was lying on the counter. The clerk observed the action, and soon afterward, with startled mien, called aloud into the shop : "What has become of that lump of arsenic that was lying here?" The poor fellow felt hot and cold, and in his terror confessed the deed. "You are a dead man!" said the pert clerk ; "but I have here an antidote. Quick ! take as much of it as you can swallow." And he filled a tumbler full of salt and water. The poor fellow eagerly drank off the abominable stuff to save his life if possible. He then rushed out in order to secure a second antidote from a neighboring pump. He has never been known to pilfer sugar since that day.—*London Grocers' Chronicle.*

METHOD OF MAKING A SANITARY INVESTIGATION OF A RIVER.

By Charles C. Brown, C.E., Union College, Schenectady, N. Y.

The following programme of the investigation of the Hudson River and its tributaries has been worked out in our labors for the State Board of Health during the last four years, and may be of interest. The work commenced with an inspection of the shores of the river to determine the causes of certain nuisances which existed along its banks and to determine the method of abating these nuisances. These consisted principally of marshes or badly drained pools, with some areas partly covered with water at high stages but open to the sun at low water. A few nuisances arising from the deposit of garbage or the discharge of sewage were also found. All these were evident on inspection, and it was possible to abate most of them with little difficulty. In any other case the same would usually be true, except where there are large areas of bottom land which are overflowed by high water and are not well situated for drainage after the high stage is passed. It is possible, however, except in the largest watersheds, to drain much the largest part of such lands. There is no question that such bad conditions as are often found have a decided effect upon the salubrity of the neighboring lands, and that sooner or later treatment of the problem of drainage must begin and be carried through as rapidly as funds will permit.

Where a river is also used as a source of water supply, a much more detailed study must be made of its condition and possibilities. In the case of the Hudson, a study of he geology of the watershed was made to show what the inorganic chemical impurities of the water might be, the result being very favorable to the purity of the water, as much of the area is covered by the oldest formations, and supplies but little inorganic matter of any sort. The southern tributaries of the Mohawk bring in more such matter, in the form of lime from the Helderberg and neighboring formations, than any other

part of the watershed. Where the surface soil is made up of disintegrated rock it may have a beneficial effect upon the water by acting as a filter to remove some of the organic matter, or it may have a deleterious effect by adding much alkaline matter to water percolating through it. In some cases this may be so serious as to prevent the use of water from some parts of the watershed for water supply. In connection with this study of the geology goes the study of the organic pollution from vegetable sources, since much of this comes from marshes and swamps whose existence is due to the arrangement of the geological strata. There are cases where the amount of such pollution is excessive. It is probable, however, that there are very few cases where the swamps cannot be drained and thus greatly improve the condition of the water. Much of the water from the upper Hudson and the northern tributaries of the Mohawk shows the effect of this sort of pollution, but the dilution from comparatively unpolluted sources is great enough to reduce it far below the objectionable point.

After this study, which usually is not very important, comes the study of the pollution by the population on the watershed. In investigating the purity of an established supply or in selecting a new one this is the most important study of all. We have approached the subject in three ways, keeping the results obtained by the three processes in juxtaposition so that they can be used as mutually explanatory. The first and, after sufficient experience in judging effects, the best method is by actual inspection of the polluting matters discharged into the stream. These matters consist of sewage, garbage, drainage from fertilized fields and other sources of animal matter, and the discharges from manufacturing establishments, some of which are chemicals and some putrescible organic refuse. In connection with this inspection goes a determination of the amount of water flowing in the stream at the point of entrance of the polluting matter. A careful study of the relative amounts of polluted liquid and river water with the proper consideration of the amount of pollution the water already contains and the character of the new supply will give a very clear idea of the condition of the resulting mixture. Detailed study by chemical and biological methods of typical

conditions will bring one to the ability to determine by the inspection the probable condition of new streams in approximately the same circumstances. In our own case, having but little material obtained under the conditions existing in this country, it was necessary to make this detailed examination.

The second process applied to the river was, therefore, the chemical analysis of numerous samples from various places. It is usually considered that the elements determined in water analysis which denote the amounts of organic matter in different forms and the amount of salt are the important ones. The list included, therefore, albuminoid and free ammonia, nitrogen as nitrates and as nitrites, chlorine, oxygen absorbed, as well as the total solids, loss on ignition, color, appearance, and odor at 100° F.

The third process applied was the biological analysis of samples of water taken from the same places as those for chemical analysis and from many more. The biological analysis may be made with reference to the number and kinds of algæ, infusoria, and other microscopic animal and vegetable life, with reference to the numbers of bacteria, and with reference to the numbers of such species of bacteria as can be recognized as coming from sources which are dangerous or suspicious. All of these determinations will be valuable in deriving a basis for a definite opinion as to the character of the water. A few experiments were made under the first head, and it was found that as regards flowing water in rivers this determination was not as necessary as others, moreover, the methods of such analysis have been well elaborated by others, therefore it was left until a more convenient season. It is advisable to make this analysis on some samples, however, to secure the fullest knowledge possible.

As regards the determination of numbers of bacteria, it was soon discovered that in order to determine the relative amounts of pollution in the rivers at different places, it is necessary to reduce the possible sources of addition to the numbers of bacteria to a minimum. This is done by waiting until a rainless period, or nearly so, has intervened of sufficient duration to reduce the river to its low stage and then give time for the collection of the samples. It is possible by taking this precaution to show the increase in pollution by showing the in-

crease in numbers of bacteria below the source of pollution. Rains, sharp and heavy or long continued, will wash into the stream much matter from the soil, abounding in bacteria, so that the indications of pollution from the constant flow of sewers and the like will be greatly obscured. It is probable, also, that it would be difficult to compare the purity of two streams in widely different parts of the country or in different conditions as to soil, slopes, area of watershed, etc., on account of the consequent variations in numbers from what may be called outside sources. Our work has shown the possibility of determining the relative increase in pollution in the flow of a single river when proper precautions are taken. One point to be mentioned is that where sewage is discharged into still water much of it will settle at once, and samples taken near the surface will not show the full effect of its presence.

The numbers of bacteria, at least unless determined without the greatest care to eliminate all disturbing conditions, are not therefore so important an indication as is desired. It is well known that there are species of bacteria which exist under their most favorable conditions in the intestines of men and the higher animals, but will live for a greater or less length of time in other places. If the numbers of such bacteria could be ascertained, the relative amount of pollution from such suspicious sources would be best determined. On the recommendation of Dr. Theobald Smith, of Washington, we tried the method of determining the numbers of *bacillus coli communis*, by the fermentation-tube method. This bacillus was selected because it is the most common in fecal matter, and its growth in such media as ordinary river water at ordinary temperatures is believed to be very slow, if there is any. The method suggested by Dr. Smith was found to be easily applicable in practice, and some very valuable results have been secured. It promises to be a most valuable aid in determining the pollution of water, and is especially valuable because it gives the statement of the serious part of the pollution, while all the other methods mentioned are open to the objection that they may reject a water which has a large amount of pollution not from dangerous sources, the water being, therefore, comparatively clean ; while they may, on the

other hand, pass as good water which shows but little actual amount, that amount being of a very suspicious nature.

Many of the results of the investigation whose programme is presented above are given in the last four reports (tenth to thirteenth) of the New York State Board of Health. A paper by Dr. Smith, giving the argument for the selection of *bacillus coli communis* as the index of pollution, is given in the thirteenth report. The investigation is not yet finished, and other reports will follow until sufficient data have been obtained to warrant a definite statement as to the condition of the water at the intakes of the various waterworks which draw from the lower parts of the rivers under investigation. It is believed that the work done shows that the programme given above is the proper one to follow, and this statement of it is therefore made with the hope that it will be found useful in other cases. Considerable experience in selecting conditions and in collecting samples and data will be necessary to make one expert in drawing definite conclusions from the results obtained.—*Science, May 3d*, 1893.

Erroneous Idea on Ptomaines.—The *British Medical Journal* points out that not only the community at large, but also many physicians, seem to have wrong ideas about the chemical products of bacteria. The principal error consists in supposing that the toxic properties of these substances can be destroyed by heat, such as is sufficient to destroy the bacteria themselves. Many of these toxines are very stable against heat ; and although the bacteria which produced them may be entirely destroyed, the poisonous properties of the substance may remain. Canned goods, if they contained these products when they were put up, may be poisonous, even though sterile. Another mistake is to suppose that the ptomaines are necessarily dissolved or distilled by boiling, but they may remain hidden in the centre of a piece of meat. It is perfectly possible to suppose that one sardine only out of a box may be poisonous.

VENTILATION.

NOTORIOUS examples of the failure of mechanical ventilation by impulsion, or artificially forcing air into a building, are the new London Law Courts and Houses of Parliament, where mechanical arrangements are employed, and all that money and the highest scientific and engineering skill could do to make the ventilation satisfactory has been tried, but without success. Mechanical ventilation by impulsion forces air into a building under pressure, and at a high velocity, destructive of diffusion, causing disagreeable and dangerous draughts in the vicinity in the line of the inlets and outlets, the other parts of the building being left wholly unventilated, as the incoming columns of air usually travel, or are propelled, in a direct line to the nearest outlet, and there make their escape. Engine-driving columns of air through a building is not ventilating it.

It will, therefore, be evident, as is recognized by the authorities, that it is wholly misleading and incorrect to take the registered volumes of air forced into or out of a building at certain points as in any way indicating how often in a given time the whole of the air is changed. Analyses of the air taken—as is but too commonly done—from the immediate vicinity of the points of admission are also equally misleading, and do not demonstrate—as the uninitiated might suppose—the general purity of the air, as other parts may be quite stagnant and vitiated, though it is usual to tabulate the average, which is, obviously, again misleading. This is the chief cause of the complaints which are so constantly made with respect to the unhealthiness and discomfort of buildings mechanically ventilated by impulsion, which, owing to the compression of the columns of air forced in, and also of the atmosphere of the building, causes headache and a feeling of oppression, and is an actual source of danger to health and life ; and it is a well-known fact that those employed in public buildings mechanically ventilated by impulsion constantly complain of feeling ill, and are frequently incapacitated from fulfilling

their duties. The evils described are accentuated when it is attempted to deliver air into a building at the higher levels—that is, to create a continuous down-draught—and to expel it at the floor-line. But this method is seldom or never employed, though from time to time it is advocated in some form or other, and it is universally condemned by scientific authorities as most pernicious, contrary to the laws of nature, and, from causes which are well known, fatal to health, insidiously sowing the seeds of disease, which sooner or later develop into rheumatism, chronic neuralgia and various forms of pulmonary complaints.

A report was published a few years ago by the late Professor Carnelly, which caused considerable controversy at the time.

Professor Carnelly's report on the heating and ventilation of schools is all the more remarkable when it is considered that mechanical ventilation was the professor's pet hobby, and, though compiled with a very different intention, there never was formulated a stronger indictment against the advantages of mechanical ventilation and heating as compared with the cost of that method. The exposition contains a valuable lesson to those capable of understanding it.

It is stated that an installation of a mechanical system of ventilation and heating in a school for 1000 cost 24*s.* per head, as against 2*s.* 5*d.* for a natural system, the average for a number of schools of the same size in different towns being 20*s.* and 4*s.*, respectively, though in schools for less than 1000 the cost of the mechanical system would be greater in proportion. "In naturally ventilated schools," the report states, "the cost of the ventilation is but a fraction. With mechanically ventilated schools this comparison cannot be made. To fit up a school for 1000 children with mechanical ventilation would cost from £400 to £700 more than if one of the ordinary methods were employed." The report bristles with elaborate calculations and tables, which so impress the non-statistical mind, but, when analyzed, are found to prove very little either one way or the other, the results obtained in certain schools mechanically ventilated, when tested on different occasions, being most erratic and contradictory; and, when one school was compared with another, these conditions were

found to be even more pronounced, while the difference in the purity of the atmosphere in the schools mechanically ventilated and tested, as compared with the schools having a so-called natural system of ventilation, which consisted in the cases described of simply the windows and doors, was absurdly disproportionate to the cost of the one as compared with that of the other.

It is a curious fact, and one that should be carefully noted, that in the whole of the report not one single instance is given of the mechanical system having been tested against or even compared with any automatic system, the schools mechanically ventilated being tested against schools having only the windows and doors to rely upon for ventilation—that is to say, schools in which no system of ventilation existed at all.

It would have been interesting to have known what the results would have been had a good automatic system been in use, applied under equally skilled advice as the mechanical, which is, of course, as necessary to insure the success of an automatic system of ventilation as of any other engineering undertaking.

One is struck, upon a perusal of the report, with the extreme one-sidedness as well as by the futility of the deductions arrived at, as, beyond showing that the advantages gained with a mechanical system are, in the cases cited, ridiculously out of proportion to the expenditure incurred, they are, for all scientific or practical purposes. valueless, as they prove no more than that an elaborate and costly system of mechanical ventilation has been found in a few special instances to be slightly more effective than where there was *no system of ventilation in use at all.* At least, the same results might have been achieved with an automatic system properly applied at a fraction of the initial cost, and no after-expense for maintenance (which, with a mechanical system, is considerable). Indeed, it is admitted by Professor Carnelly that in the reports received by him from schools ventilated with automatic systems consisting of roof extraction-ventilators and fresh-air inlets, the ventilation is described as "highly satisfactory;" also that, among others, the report *re* mechanical ventilation received from the clerk to the Birmingham School Board stated: "Mechanical ventilation has not worked satisfactorily,

and it is still a question whether we have gained by its adoption anything equivalent to the expense."

Architects and school boards contemplating the adoption of mechanical ventilation would do well to first procure a copy of Professor Carnelly's report, and carefully read and digest the same before expending their clients' or the public's money, and satisfy themselves if the outlay would be justified by the results as therein tabulated, and whether the same or better might not be secured by simpler and less costly methods. The results attained in other quarters certainly point in this direction, but, whatever system may be selected, it should always be borne in mind that any plan which creates a down-draught is essentially dangerous to health.

Who, indeed, does not know the terrible and too often fatal consequences of sitting in a continuous down-draught, however insidious or of whatever temperature, and which is quite unavoidable with any system which delivers the air-supply at the upper part of a building and expels it at the lower? The air may possibly be changed by such a method, but at what a price. The Spaniards, even with their genial clime, fully recognize the seriousness of this danger in one of their most time-honored proverbs: "The two greatest evils in life are a through-draught and a scolding wife."

With all down-draught systems diluted foul air only is breathed, never fresh, pure air, as the respired and exhausted air first, owing to its greater levity, ascends, and is returned by the downward current to the breathing-level mixed with the products of combustion, and is there re-inhaled. Only a very strong and what would be an unendurable down-draught could prevent the highly rarefied respired air from rising to at least the height of the crown of the head, which is sufficient to insure its re-breathal. Analyses of air taken from any part of a building, when occupied and ventilated with a down-draught system other than close to the person, and immediately above and also below the breathing-level, would be most misleading, as the air one foot away from the breathing zone, with which, owing to the downward vertical current, it does not mix, would be comparatively pure.

An analysis of air taken from a building when it is unoccupied would, of course, prove nothing beyond the purity of the

atmosphere when there was *nothing to vitiate it.* It is well known that, with mechanical ventilation, and especially so with a down-draught method, the natural law of diffusion, to which it is the antithesis, is rendered practically inoperative. —*Building News.*

MAIZELINE, A NEW CORN PRODUCT.—Mr. Benjamin G. Hudnut, of Hudnut Milling Co., Terre Haute, Ind., has invented a new corn product, called by him "maizeline." It can be used either as a food product or for brewing and distilling purposes, but it is especially adapted to the latter. As a malt substitute, it is far superior to any heretofore made from corn in the quality and quantity of extract it produces, and the quickness and thoroughness of its transformation by the diastase. It has somewhat the appearance of granulated sugar, the particles being small, light and crystalline, and sparkle in the light. The starch of the corn has been converted into thoroughly soluble starch, which can be immediately and completely acted upon and converted by the diastase into saccharine matter. It is comparatively free from dextrine, which is so prevalent in other malt substances, and which is not transformed into saccharine matter, as is desired, but into a gummy, or mucilaginous substance ; this latter substance is not desirable in beer, so that part of the starch of the corn which is converted into dextrine is not only lost, but usually proves detrimental to the beer. With maizeline the resulting extract has more saccharine matter in it and produces more and better beer than other corn products for that purpose.

The particles are so small and light that the maizeline need not necessarily be placed on top of the malt in the tub to keep it from sinking to the bottom ; but it can be mixed through the malt, thereby insuring a quicker union with the diastase, and there is no reason to fear that it will sink to the bottom and set, or become clogged, as is the case with other malt substances from corn. For these reasons, the malting process need not be long, and the temperature of the mash can be kept very low, thus avoiding the formation of dextrine. Maizeline is highly adapted for use in distilling.—*Milling.*

DRAFT OF A PROPOSED BILL TO ESTABLISH A BUREAU OF PUBLIC HEALTH.

THE NEW YORK ACADEMY OF MEDICINE,
No. 19 WEST FORTY-THIRD STREET, July 12, 1893.

THE undersigned, a committee of the National Quarantine Committee of the New York Academy of Medicine, have been instructed to prepare a bill to be submitted to Congress, creating a public health organization in the General Government. With a view to harmonize conflicting views on the plan of organization, about which there is a diversity of opinions, in order to concentrate upon a single measure the efforts of all who are interested in securing the necessary legislation, we herewith tentatively submit the sections of a bill organizing a Bureau of Public Health, for the purpose of eliciting a full and free discussion of the subject before finally determining the precise form which the committee will adopt. While the committee believe that the plan submitted is more nearly in accordance with the opinions of those whose judgment and experience are most valuable, it is prepared to give due consideration to any modifications which may be proposed. The remaining features of the bill, which define the functions of the Bureau, will be submitted hereafter. All communications addressed to the Secretary of the Committee, Dr. J. H. Girdner, will be duly considered.

JOSEPH D. BRYANT, *Chairman.*
RICHARD H. DERBY,
EDWARD G. JANEWAY,
T. GAILLARD THOMAS,
DAVID WEBSTER,
STEPHEN SMITH,
J. H. GIRDNER, *Secretary.*

A Bill to establish within the Treasury Department a Bureau of Public Health.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled :

SECTION 1. That for the purposes of this Act the States and Territories of the United States be and are hereby grouped into districts, to be known as "The Sanitary Districts of the United States," as follows :

The Northern Sanitary District shall include the States of

Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, Wisconsin.

The Northeastern Sanitary District shall include the States of Connecticut, Massachusetts, Maine, New Hampshire, New York, Rhode Island, Vermont.

The Northwestern Sanitary District shall include the States of Idaho, Montana, North Dakota, Oregon, Washington, and the Territory of Alaska.

The Eastern Sanitary District shall include the States of Delaware, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia, and the District of Columbia.

The Western Sanitary District shall include the States of California, Nevada, Utah, and the Territory of Arizona.

The Southern Sanitary District shall include the States of Arkansas, Alabama, Kentucky, Louisiana, Missouri, Mississippi, Tennessee.

The Southeastern Sanitary District shall include the States of Florida, Georgia, North Carolina, South Carolina.

The Southwestern Sanitary District shall include the State of Texas and the Territories of Indian Territory, New Mexico, Oklahoma.

The Central Sanitary District shall include the States of Colorado, Kansas, Nebraska, South Dakota, Wyoming.

SEC. 2. That there shall be established in the Treasury Department, under the direction and supervision of the Secretary thereof, a Bureau of Public Health, to consist of a Commission of fifteen, of whom eleven shall be appointed by the President, by and with the advice and consent of the Senate, as follows—viz.: One Medical Commissioner from each of the "Sanitary Districts of the United States," provided in section one of this Act, and two commissioners at large; the compensation of the appointed commissioners, when actually engaged in the performance of their duties under this Act, shall be ten dollars per diem and reasonable expenses. The other four members of the commission shall be the Surgeon-General of the Army, the Surgeon-General of the Navy, the Supervising Surgeon-General of the Marine Hospital Service, and an officer, learned in the law, detailed by the Attorney-General from the Department of Justice; these four members shall receive no compensation.

SEC. 3. That the members of the Commission shall meet at

such time and place as may be designated by the Secretary of the Treasury, and organize by the election, from their own number, of a President, who shall be one of the members at large, and who shall receive five dollars per diem, in addition to the ten dollars per diem provided in the last section, when actually engaged in the performance of his duties under this Act. The Commission may appoint a Secretary, not one of its number, and fix his salary at a sum not exceeding three thousand dollars annually. The Commission shall thereafter meet annually, at Washington, on the first Tuesday of October, and at such other times and places as the President of the Commission, with the approval of the Secretary of the Treasury, shall designate.

SEC. 4. That there shall be an Executive Committee of the Commission, consisting of its President, the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Supervising Surgeon-General of the Marine Hospital Service and the officer detailed by the Attorney-General. The Commission shall from time to time prescribe the duties of the Executive Committee, and may make all needful rules and regulations for its own control and for the guidance and discipline of all its officers and employés, and shall establish all rules and regulations for the government of national sanitation in all of its foreign and interstate relations, and special departments in the enforcement of the provisions of this Act.

SEC. 5. That when, in the opinion of the President of the Commission, the interests of the public health would be promoted by a conference of the Commission with the State Boards of Health of the several States, or of any sanitary district or districts, he is hereby authorized to invite, with the approval of the Secretary of the Treasury, said State Boards of Health, or such number thereof as he may designate, each to delegate one of its members to meet the Commission in conference at such time and place as he may appoint; the President of the Commission shall be the President, and the Secretary of the Commission shall be the Secretary, of any such conference; the delegate in attendance upon the conference from each State Board of Health shall be entitled to receive reasonable compensation for expenses for a session not exceeding three days, to be paid on vouchers provided by the Secretary of the Treasury.

TOPOGRAPHY, CLIMATE AND MINERAL SPRINGS OF VIRGINIA.*

By A. N. Bell, A.M., M.D.

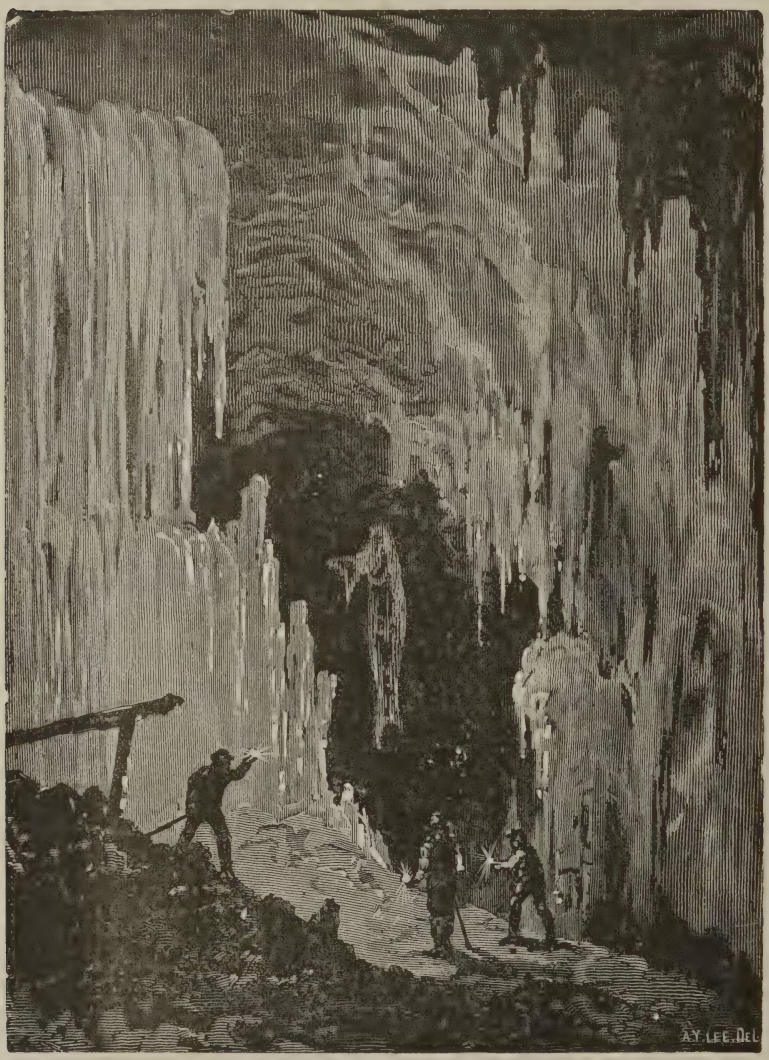
The Shenandoah Valley is remarkable for the beauty of its scenery, caves, and waterfalls. *Via* the Shenandoah Railway southward, ninety miles from Hagerstown and a few miles from Front Royal Station, the line passes through the foot-hills of the Blue Ridge, whose rocky peaks are far enough away to present many views that excite admiration. Here Page Valley—a subordinate valley of the Shenandoah—is reached ; a place which has become famous during recent years on account of the great caverns that have been revealed.

The rocks throughout this region are topsy-turvy, sometimes flexed into great folds, the direction of which coincides with that of the Appalachian mountain-chain. Hidden in the woods near the top of one of these hills, about a mile east of Luray, an old cave has long been known to exist. Connected with it are traditions which reach back to the Ruffners, the earliest settlers of the valley, and it has taken their name.

In 1878, Mr. B. P. Stebbins, of Luray, conceived the project of a more complete exploration of it, with a view of making it an object of interest to tourists, and he invited the co-operation of the brothers Andrew and William E. Campbell. These gentlemen declined to go into the old cave, but were ready to engage in a search for a new one, and went ranging over the hills, but for four weeks succeeded only in exciting the astonishment and ridicule of the neighborhood, when, returning one August day from a long tramp, the men approached home over the hill where Ruffner's cave was. In the cleared land on the northern slope, a couple of hundred yards or so from the mouth of the old cave, was a sink-hole choked with weeds, bushes, and an accumulation of sticks and loose stones, through which they fancied they felt cool currents of air sifting.

Laboriously tumbling out the bowlders, Mr. Andrew Campbell was finally able to descend by the aid of a rope into a black abyss, which was not bottomless, however, for he soon let go of the rope and left his companions on the surface to their conjectures. Becoming uneasy at his long absence, his

* Continued from page 57.



PLUTO'S CHASM—THE SPECTRE.

brother also descended, and together the men walked in a lofty passage for several rods, where their progress was stopped by water. Returning, they told Mr. Stebbins what they had seen, and all agreed upon a policy of silence until the property could be bought. Then they went home and dreamed of "millions in it." Such was the discovery of the

Luray Cave.

The property was bought of a bankrupted owner, at sheriff's sale, but upon an intimation of its underground value, one of the relatives of the original owner sued for recovery upon an irregularity in the sale, and after two years of tedious litigation he won his suit.

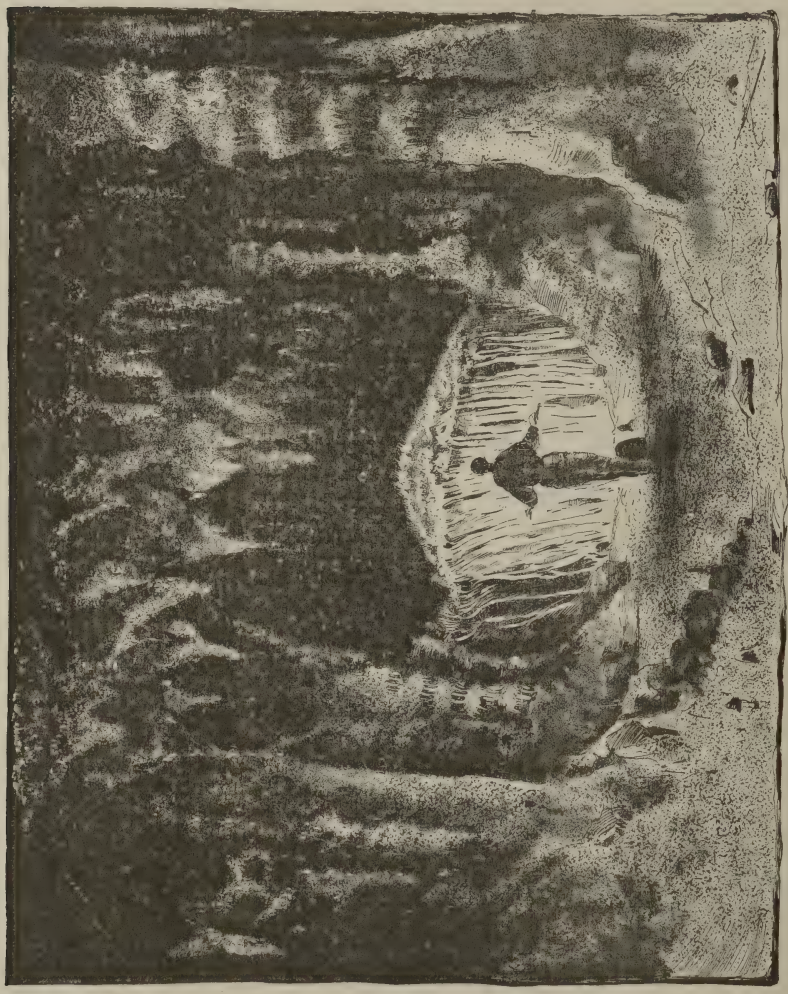
It is a little over a mile from the hotel at Luray to the cave, and, if in August, a hot walk ; but stages frequently ply between, and one had better not enter the cave too hot, lest chill supervene. The temperature within is cool—about 56° throughout the cave and the year. There is abundance of room for exercise, however, to prevent chill, and board or cement walks have been p ovided over the damp floor in some places ; but it is better anyhow, for ladies in particular, to wear rubbers, and a light wrap will not be amiss, though there is no dripping from above.

The entrance is as though you had been dropped into the midst of it, or had waked from a sleep there, and is most effectual in putting the stranger *en rapport* with the spirit of the place. As described by a visitor :

" The darkness was only faintly illuminated by our few candles, and I was about to remonstrate, when the click and flash of an electric arc flooded the whole place with light. Our few candles were intended merely for peering into dark corners and helping our footsteps—the general illumination is accomplished by dozens of electric lamps hung in all parts of the wide-winding vaults and passages.

" From the first chamber we proceed upon a causeway of cement for a short distance past the ' Vegetable Garden,' the ' Bear Scratches,' the ' Theatre,' the ' Gallery ;' over ' Muddy Lake ' on a planking-bridge, which is itself spanned by a stone arch ; through the ' Fish Market ' and across the ' Elfin Ramble '—a plateau in which the roof is generally within reach of the hand ; and so come to ' Pluto's Chasm.'

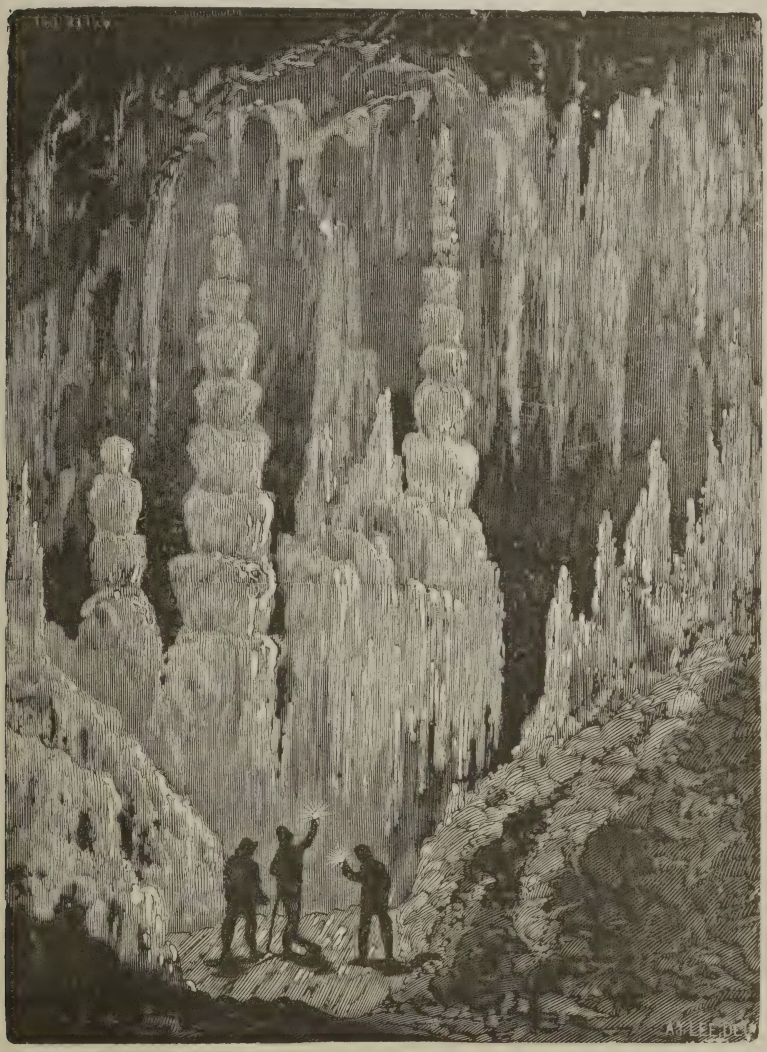
" From the chasm, where there is a ' Bridge of Sighs,' a ' Balcony,' a ' Spectre,' and various other names and habitations, we recross the ' Elfin Ramble,' pass successively ' Titania's Veil,' ' Diana's Bath '—the lady was not fastidious—and come to a very satisfactory ' Saracen Tent.'



CATHEDRAL—ORGAN-ROOM.

"Then we ascend stairways past the 'Empress Column' and proceed under the 'Fallen Column' to the spacious nave of the 'Cathedral.'

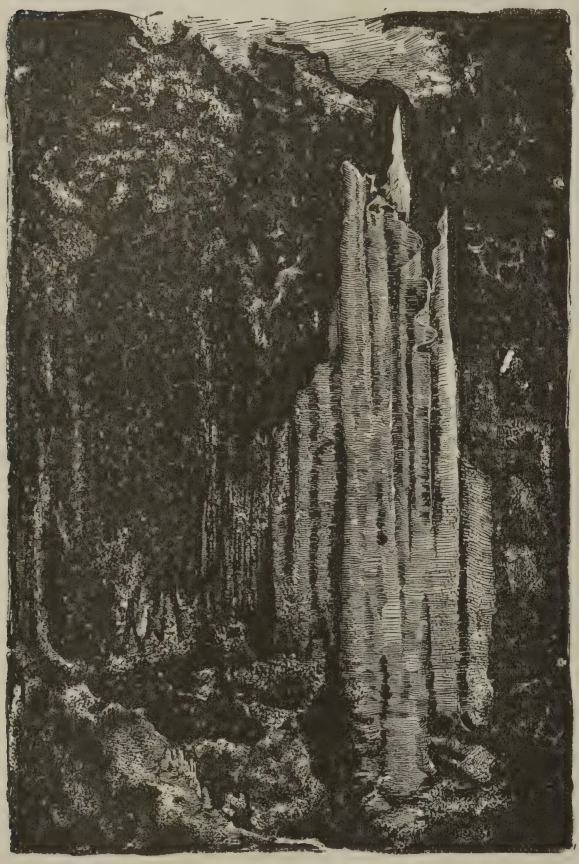
"Leaving the Cathedral, we look down into a sort of devil's pantheon, full of grotesque shapes and colossal caricatures of things, animate and inanimate, casting odd and suggestive shadows, in whose gloom fancy may work marvels of unworldly effect, and then are led by a stairway to a well-curtained room called the 'Bridal Chamber.'



GIANTS' HALL.

"The back door of the 'Bridal Chamber' admits to 'Giants' Hall,' just beyond which is the 'Ball-Room'—both large and lofty apartments, constituting a separate portion of the cave, parallel with the length of 'Pluto's Chasm.' In the 'Ball-Room' we have worked back opposite the entrance, having followed a course roughly outlined by the letter U."

Retracing our steps to the main route through Giants' Hall, we find ourselves hard by Proserpine's Column, and looking down the ravine, the Spectre again comes in view ; and while taking a periscopic view, a harmony of soft, sweet sounds falls upon the ear from some invisible source far away.



THE WET BLANKET.

The Saracen's Tent is upon our right. It is a large circular space enclosed by long yellow draperies depending from a ceiling some fifty feet above the observer's head. From the outside it is strikingly suggestive of an Oriental pavilion. The Tent affords a fine view of all that part of upper Giants' Hall which goes under the name of The Cathedral, or Organ Room, and of part of the lower Hall.

Let us enter this Titanic tent. Below and stretching far away to the right is an immense chasm, high and broad, and remarkable for the great size of its formations. The lofty ceiling is scarred with the wounds of huge stalactites broken off ages ago by their own weight and fallen to the floor. Most of these being disintegrated by the acid waters about

them, have disappeared. Two remain. One, the Organ, a mass of dripstone with long sonorous stalactites still attached, upon which notes may be sounded. The other is the Fallen Column, a fragment of its former self, but still a monster, twelve feet in diameter by twenty in length, and of an age estimated by some scientists at millions of years.

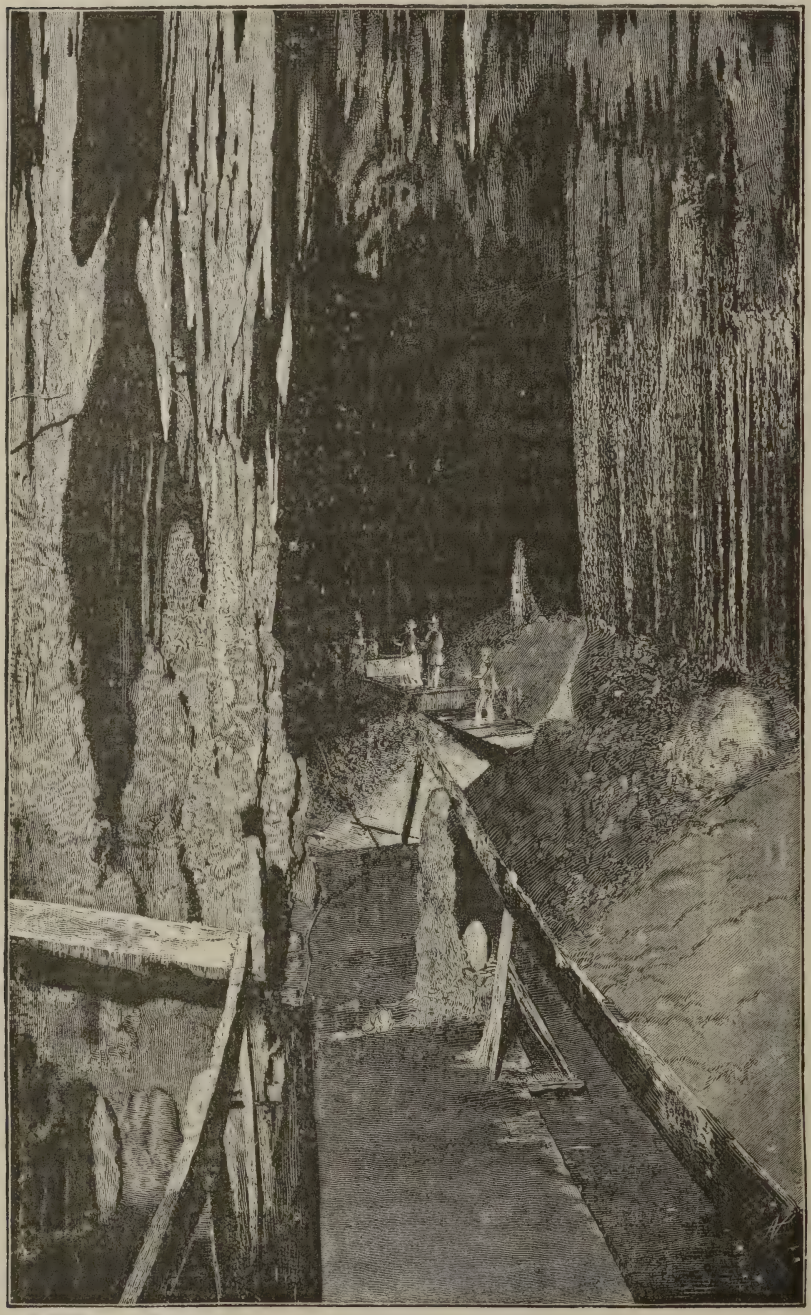
Farther on we come upon the Camel and Jumbo. The latter is a stalagmite whose outline suggests the proboscis, head and back—howdah included—of an elephant. Within ten feet of Jumbo we see the head, neck, and hump of the "ship of the desert." It has feet, too, says Sam Smith, our guide —"if we *measure* it." The Handkerchief is a pretty piece of stone drapery. The chief attraction of the room, however, is the Wet Blanket, a very beautiful piece of drapery in translucent stone from the ceiling. The guide by means of a pole will lift his light behind it, so as to bring out the colored stripes that follow the lower border of the Blanket through all its intricate folds.

Leaving the Blanket Room and returning to the Fallen Column, and passing under it, we again enter the Cathedral. Advancing a few steps, we approach the Organ, whose pipes when struck by the guide emit various notes. On the left is a group—Christ Blessing Little Children. Near this group is the Sleeping Infant with its head pillowed upon a stalagmite.

To the right are the Chimes, a number of short stalactites, which, under the guide's skilful touch, produce the sweet tones heard on first entering the vestibule of this hall.

Proceeding toward the entrance to the Ball Room, we plunge into a dark ravine upon the left; and mounting a flight of steps, find ourselves on the second story of the cave, and at the opening into Campbell's Hall. It is an apartment of irregular shape, about one hundred and fifty feet in diameter and thirty-five feet high, remarkable for the variety of color and fine state of preservation of its formations. Some are of pearly whiteness, others are red, bright yellow, gray, bluish, and jetty black. It is worthy of remark that the Coral Spring derives its waters from this place.

Specially to be noted is Alcinda's Spring, or the Fountain in Tiers. Imagine upon the summit of a bank of stone a large shallow basin filled with pellucid water. Its outflow is re-



ceived into six other small basins arranged in graceful curves along the slope below. The sides and bottoms of all are covered with calcite crystals of an amber color. In the larger basin stands a brown column three feet high, whose base is beautifully broadened with a wreath of crystals as far up as the water reaches. The Scale Column is sheathed in crystals resembling scales. Campbell's Hall answers to our highest conception of the ornamental in cave scenery, since here, to a remarkable degree, the formations retain their original beauty. During the past winter extensive improvements have been made. In the stairways, bridges and walks, in this portion of the Caverns, brick and cement have taken the place of wood, rendering this superb Hall and its varied beauties accessible to the visitor without the former risks and inconveniences.

On making our exit we discover over our heads two folds of stony cloth, of light color, translucent and finely striped with opaque bands of snowy whiteness—the prettiest in the cave.

Chief of all the ornamental formations, and in lavish profusion everywhere in these caverns, is the stalactite, which, by growing on the edges only, produces not a round, icicle form, but a wide and thin laminated or sheet form, which is better described by its semblance to heavy cloth hanging in pointed folds and wrinkles, as a table-cover arranges itself about a corner. But this is only an introduction to one of the fascinating pictures of the Shenandoah. Many more are to be seen farther on.

Forty miles southward is Grottoes Station, on the line of the two large and rich counties of Augusta and Rockingham.

Grottoes Hotel is one of the meal stations ; it is also, and more especially, the stopping and resting-place for visitors to the two famous caverns known as Weyer's Cave and the Fountains Cave, together called the

"GROTTOES OF THE SHENANDOAH."

These with their numerous halls and chambers of great extent occupy the largest part of the interior of the curiously formed and commanding ridge that rises so boldly just to the westward of Grottoes Station and hotel, and but a short distance away across the stream-valley of the South River of the Shenandoah.

From the broad verandas of the hotel, grand landscapes stretch away in all directions. To the east and south, over the tops of acres of forest of pines, oaks, and scores of other trees, part of the great park of hundreds of acres of valley and stream, and forests, and ridge and tableland, pertaining to the Grottoes, appear the domes, spurs, and majestic outlines of the Blue Ridge. To the northeast rolls away, in graceful and varied undulations, the famous valley of the Shenandoah, five and twenty miles in breadth, from the Blue Ridge on the east to the Great North or Shenandoah Mountains on the west, a glorious tableland from 100 to 1500 feet above tide, until miles away the remarkable Massanutten ranges (Stonewall Jackson's strategic mountains) rise grandly, as a central axis in the valley, dividing it into eastern and western valleys, and the three giant mountain chains, with crest-lines from 2500 to over 4000 feet above the sea level, and the two included valleys that stretch away until lost in the far distance.

A noble avenue, a hundred and fifty feet wide, with walk ways, carriage ways, and a wide riding way leads from the hotel to the westward, about half a mile, crossing South River of Shenandoah by a fine new suspension foot bridge, from which a lovely river landscape is seen, to the foot of Grottoes Ridge, whence nicely graded walks ascend the side of the Ridge ; one to the right to Weyer's Cave and the other one to the left to Fountains Cave.

Weyer's Cave has more than a mile of halls, chambers, and passages, all magnificently and wonderfully adorned by stalactites and stalagmites of all sizes, from that of a straw to that of a great tower, and of almost every conceivable form. For ages the work of decorating the miles upon miles of walls, galleries, alcoves, arches and ceilings of the scores of rooms of this magnificent subterranean temple has gone on unceasingly, with no moment of respite, with myriad-handed and all knowing nature for the artist, and so no wonder that nothing known can surpass the wonderful works here to be seen. Electric light having the power of many thousands of candles, operating by the alternating system, has, with remarkable skill and a great expense, been introduced into every part of this wonderful cavern, revealing thousands of forms of stalactitic beauty, especially in the lofty ceilings of the great cathe-

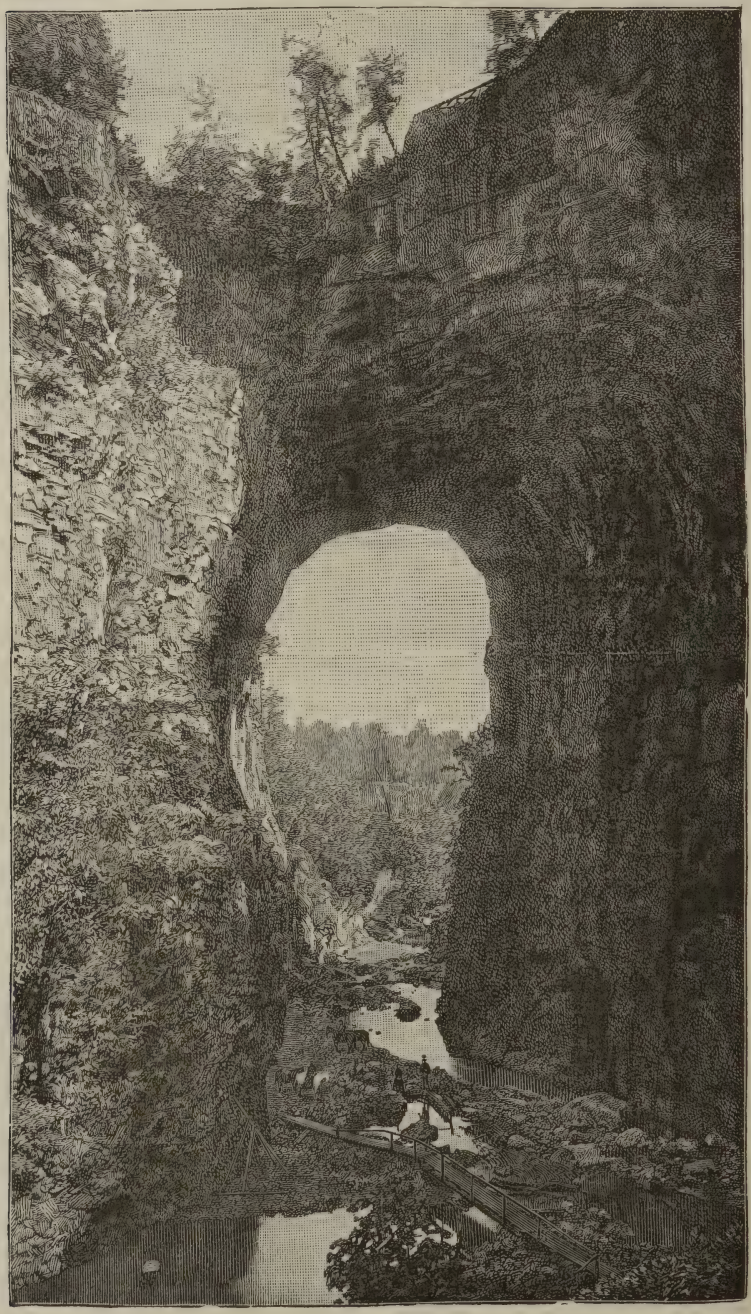
dral-like halls, from 60 to 90 feet high, that were never seen before. The noble "Washington Hall," over 240 feet long and 60 feet to the ceiling; the magnificent "Solomon's Temple," probably the most gorgeous single natural grotto in the world; the grand "Tower of Babel," a mighty colonnaded stalagmite over 50 feet in circumference; the superb "Bridal Veil;" the glittering "Diamond Waterfall;" the "Garden of Eden," a museum of bewildering wonders. These and hundreds of other objects of unfailing interest are all made gloriously visible by the admirable electric lights.

No expense has been spared to make every portion of this cave easy of access; its floors are all dry and either solid stone or earth; all narrow ways have been widened and steep ones been made easy, so there is nothing to hinder the fullest enjoyment of the wonders of this famous cavern. Its dry and even-tempered atmosphere (always about 53°) invites to exhilarating exercise, so that no one suffers from weariness or fatigue during the one to two hours generally consumed in going through this cave.

The Natural Bridge, in Rockland County, one hundred and fifteen miles west of Richmond and one hundred and sixty miles southwest from Washington, is the greatest of the many natural curiosities in Virginia, and one of the greatest in the United States. As partially described in an old guide-book: "The Bridge connects two of five round-topped mountains that rise boldly from the great valley of Virginia, near the confluence of James and North rivers. These have been named Lebanon, Mars Hill, Mount Jefferson, Lincoln Heights, and Cave Mountain," all embraced in the park at the top.

Private carriage-roads, nearly ten miles long, lead around or over them, and give through arches cut in the forest or from open spaces a wonderful variety and extent of mountain scenery.

The Bridge covers an immense gorge in and at the general level of the valley of the Blue Ridge region on one side and a sightly hill on the other, at an altitude of 760 feet above sea-level. The chasm which the Bridge spans, over Cedar Creek, is 215 feet deep. Its length is 93 feet, with an average width of 80 feet; and the thickness of the arch, 40 feet. The rock



is flinty limestone in massive strata, showing no signs of wearing away or of formation by any recent cutting force of the water which continues to flow under it. Of the many descriptions which have been written of it, none is better than that of Harriet Martineau, who once visited the spot, and wrote of it enthusiastically in the second volume of her "Retrospect of Western Travel" (1838). She declares that she found most pleasure in looking at the Bridge from the path just before reaching its base. "The irregular arch is exquisitely tinted with every shade of gray and brown, while trees encroach from the sides and overhang from the top, between which and the arch there is an additional depth of fifty-six feet. It was now early in July; the trees were in their brightest and thickest foliage; and the tall beeches under the arch contrasted their verdure with the gray rock, and received the gilding of the sunshine as it slanted into the ravine, glittering in the drips from the arch, and in the splashing and tumbling waters of Cedar Creek, which ran by our feet."

Historically, the earliest mention of the Bridge is by Burnaby, in 1759, who speaks of it as a "natural arch or bridge joining two high mountains with a considerable river underneath."

Washington when a surveyor for Lord Fairfax visited it, and carved his name, where it may yet be seen.

The original Bridge tract was granted by the king to Thomas Jefferson, in 1774. After he was President he visited the place, and surveyed and made a map of it.

The next year he returned, bringing two slaves, Patrick Henry and wife, for whom he built a log cabin with two rooms, and directed one to be kept open for the entertainment of strangers. The slaves were never manumitted and never recalled, the survivor dying where her master placed her twenty years before. Jefferson spoke of it as yet to be "a famous place, that will draw the attention of the world." Marshall wrote of "God's greatest miracle in stone." Clay, of "the bridge not made with hands, that spans a river, carries a highway, and makes two mountains one."

The Bridge is accessible from the east *via* the Shenandoah Valley, Chesapeake and Ohio, Norfolk and Western railroads.

There are several commodious hotels, admirably appointed, and carriages in abundance.

As a whole the Valley rises to the southwest, being 242 feet above the tide where the Shenandoah enters the Potomac and the united rivers break through the Blue Ridge at Harper's Ferry, and 1687 feet where the waters of the Holston leave the State and pass into Tennessee. The entire Valley appears then as a series of ascending and descending planes, sloping to the northeast or the southwest. That of the Shenandoah rises from 242 to 1863 feet along the line of its main stream, in 136 miles, looking northeast; those of the James slope both ways, from the Shenandoah summit to the southwest, and from the Roanoke summit to the northeast, and so on. This arrangement gives this seventh great step a variety of elevations above the sea from 242 to 2594 feet, or even to 3000, in a great enclosed valley, subdivided into very many minor valleys, giving "facings" in all directions; for the whole Valley has a very decided southeastern inclination, to be considered in this connection, its western side being from 500 to 1000 feet in surface elevation above its eastern, presenting its mass to the sun, giving its streams a tendency to flow across it toward the east, as the result of its combined slopes, and making the main drainage way hug the western base of the Blue Ridge. A moment's reflection will show that this is a well-watered country, having a wealth of water-power and drainage and irrigation resources almost beyond estimate.

The aspect of this region is exceedingly pleasant. The great width of the Valley; the singular coloring, and wavy, but bold outline of the Blue Ridge; the long, uniform lines of the Kittatinny Mountains, and the high knobs that rise up behind them in the distance; the detached ranges that often extend for many miles in the midst of the Valley like huge lines of fortification—all these for the outline, filled up with park-like forests, well-cultivated farms, well-built towns, and threaded by bright and abounding rivers, make this a charming and inviting region.

APPALACHIAN VIRGINIA succeeds the Valley on the west. It is a mountain country, traversed its whole length by the Appalachian or Alleghany system of mountains. It may be considered as a series of comparatively narrow, long, parallel

valleys, running northeast and southwest, separated from each other by mountain ranges that are, generally, equally narrow, long and parallel, and quite elevated. In crossing this section to the northwest, at right angles to its mountains and valleys, in 50 miles one will cross from 6 to 10 of these mountain ranges and as many valleys. As before stated, a strip of this region is embraced in the Valley counties, as they include the two or three front ranges that have drainage into the Valley ; so that some 900 square miles of Appalachia are politically classed with the Valley, leaving 5720 square miles to be treated of here. This, in Virginia, is an irregular belt of country 260 miles long, varying in width from 10 to 50 miles. Its waters, generally, flow northeast and southwest, but it has basins that drain north and northwest, and south and southeast. The heads of the valleys are generally from 2000 to 2800 feet above tide, andthe waters often flow from each way to a central depression—that is, from 600 to 1200 feet above sea level—before they unite and break through the enclosing ranges. The remarks made concerning the slopes of the Great Valley apply also to this section, except that the Appalachian valleys are straighter.

The particularly notable points about the climate of Virginia are, first, its range—from that of the southeastern low plain, fronting the Atlantic and tempered by it, to that of the high mountain plateaus of the northwestern margin, where cold temperature conditions prevail ; second, its mildness, on the whole, notwithstanding this considerable range ; third, its dryness, although the rainfall is abundant, and, compared with most European countries, large.

The mean annual temperature for the State is 56° ; for the Tidewater Region, 58° ; for the Middle and Piedmont, 35.60° ; and for the Valley, 54°. The average mean temperature of the State for January is 42°, and for July 78°.

The following table represents the temperature and rainfall at nine different places of observation in Virginia, compiled from Hotchkiss's *Summary*, and the Signal Service reports for a series of years :

Meteorological Data.	Johnstown, lat. 37° 23′, lon. 75° 55′; elevation, about 50 feet.	Hampton, lat. 37° 01′, lon. 76° 21′; elevation, 55 feet.	Zuni, lat. 36° 53′, lon. 76° 51′; elevation, about 70 feet.	Comom, lat. 38° 55′, lon. 77° 18′; elevation, about 75 feet.	Vienna, 38° 55′, lon. 77° 17′ 38″; elevation, 125 feet.	Lynchburg, lat. 37° 30′, lon. 79° 02′; elevation, 575 feet.	Staunton, lat. 38° 10′, lon. 79° 4′; elevation, 1,400 feet.	Lexington, lat. 37° 44′, lon. 79° 25′; elevation, about 925 feet.	Wytheville, lat. 36° 55′, lon. 81°; elevation, 2,300 feet.
Temperature.	°	°	°	°	°	°	°	°	°
Mean temperature of year	57.1	58.5	59.5	56.8	55.9	57.3	53.6	56.5	53.8
Highest " "	95	100	104	104	93	95	93	104	95
Lowest " "	9	6	—4	6	8	9	5	—3	—4
Range of annual temperature of year	86	94	108	98	85	86	88	107	99
Mean temperature of spring	52.4	54 7	57.1	54.1	54.2	55.6	51.3	54.8	51
Highest " "	87	96	96	92	86	84	84	92	85
Lowest " "	18	18	19	17	23	18	14	17	—1
Range " "	69	78	77	75	63	66	70	75	86
Mean temperature of summer	76.3	78.6	81.2	77.3	75.4	76.1	73.7	77.1	71.5
Highest " "	95	100	104	104	93	95	93	104	95
Lowest " "	57	60	60	52	57	55	56	52	49
Range " "	38	40	44	52	36	40	27	52	46
Mean temperature of autumn	58.4	58.9	55.3	57.8	57.8	57.1	52.8	53.5	50.9
Highest " "	90	92	91	86	86	82	82	90	82
Lowest " "	27	25	20	28	27	29	28	18	18
Range " "	63	67	71	58	59	53	54	72	64
Mean temperature of winter	41.3	44.7	44.6	38.2	36.5	41.3	37	40.7	35.6
Highest " "	74	78	74	72	69	66	69	74	62
Lowest " "	9	6	—4	6	8	9	5	—3	—4
Range " "	65	72	78	66	61	57	64	77	66
Rainfall.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Annual amount	33.16	40.15	42.97	29.27	48.51	44.74	41 99	48.58	35.10
Rainfall of spring	10.69	11.35	14.81	7.81	13.90	11.62	12.15	12.77	8.95
" " summer	7.45	12.60	8.80	7.32	13.90	14.30	8.78	8.29	11.05
" " autumn	6.75	6.80	8.52	8.68	9.51	9.16	11.49	15.25	7.08
" " winter	8.27	9.40	10.84	5.46	11.20	9.66	9.57	12.23	8.02

To be continued.

She Didn't Know the Lady.—Mrs. Clancy: "Yis, Mrs. Muggins, Pat and Oi part to mate no more. Oi went to the hospital to ax after him. 'Oi want to see me husband,' sez Oi—'the man that got blowed up.' 'Yez can't,' sez the docther—'he's under the inflooence of Ann Estheticks.' 'Oi don't know the lady,' sez Oi, mighty dignified loike; 'but if me lawful wedded husband kin act loike that when he's at dith's door, Oi'll have a divorce from him!'"

MORTALITY AND MORBILITY STATISTICS.

By Harry Kent Bell, M.D.

Alabama.—Jerome Cochrane, M.D., State Health Officer, Montgomery.

Mobile, 31,076: T. S. Scales, M.D., Health Officer, reports for the month of May a mortality of 82, of which 53 were colored, and 31 were under five years of age. The annual death-rate per 1000 was 31.56.

Zymotic diseases caused 7 deaths, and consumption, 14.

Arkansas.—D. W. Holman, Secretary, Little Rock.

California.—J. R. Laine, M.D., Secretary, Sacramento.

Connecticut.—Professor C. A. Lindsley, M.D., Secretary, New Haven, sums up the mortality reports for April as follows:

The mortality report for May has been received from 168 towns, representing a population of 786,490.

There were 1224 deaths reported in the State during the month. This was 117 less than in April; it was 77 more than in May, 1892, and 182 more than the average number of deaths in May for the five years preceding the present.

The death-rate was 19.0 for the large towns; for the small towns, 18.0, and 18.7 for the whole State.

The deaths from zymotic diseases were 200, being 16.3 per cent of the total mortality.

The deaths from consumption numbered 136.

New Haven, 95,000: Total mortality, 161. Annual death-rate per 1000, 20.0.

Hartford, 58,600: Total mortality, 105. Annual death-rate per 1000, 20.2.

Bridgeport, 55,000: Total mortality, 70. Annual death-rate per 1000, 15.0.

Waterbury, 34,000: Total mortality, 81. Annual death-rate per 1000, 28.6.

DELAWARE.—E. B. Frazer, Secretary, Wilmington.

DISTRICT OF COLUMBIA, 250,000 : C. M. Hammett, M.D., Health Officer, reports for the four weeks ending June 24th a mortality of 500, of which number 210 were of colored people, and 208 were under five years of age. The annual death-rate was 23.5 per 1000. There were 117 deaths from zymotic diseases, and 50 from consumption.

FLORIDA.—Joseph Y. Porter, M.D., Secretary, Jacksonville.

The summary, as published in *Florida Health Notes*, for the month of April, is as follows :

Number of counties reporting, 28 ; number of cities reporting, 3 ; total population of said counties and cities, 281,036 ; number of births reported, 268 ; number of marriages reported, 239 ; number of deaths reported, 278 ; birth-rate per 1000 per annum, 11.45 ; death-rate per 1000 per annum, 11.88 ; average age of decedents, 25.69 ; number of deaths under five years of age, 105.

ILLINOIS.—J. W. Scott, Secretary, Springfield.

Chicago, 1,575,000 ; A. R. Reynolds, M.D., Commissioner, reports 2403 deaths during May, representing an annual death-rate of 18.48 per 1000.

The mortality under the age of five years was 961. The deaths from zymotic diseases numbered 392, and from consumption, 253.

INDIANA.—C. N. Metcalf, M.D., Secretary, Indianapolis.

IOWA.—J. F. Kennedy, M.D., Secretary, Des Moines, reports in the *Monthly Bulletin* for the month of May :

Council Bluffs, 35,000 : Total deaths, 18. Annual death-rate, 9.24 per 1000.

Des Moines, 70,000 : Total deaths, 70. Annual death-rate, 12.0 per 1000.

KANSAS.—M. O'Brien, M.D., Secretary, Topeka.

KENTUCKY.—J. N. McCormack, M.D., Secretary, Bowling Green.

LOUISIANA.—L. F. Salomon, M.D., Secretary, New Orleans.

New Orleans, 254,000—184,500 white, 69,500 colored. There were reported for two weeks ending June 7th, 242 deaths, of which number 115 were among the colored people, and 83 of children under five years of age. There were 42 deaths due to zymotic diseases, and 30 to consumption. The annual death-rate was 24.85 per 1000.

MAINE.—A. G. Young, M.D., Secretary, Augusta.

MARYLAND.—James A. Steuart, M.D., Secretary, Baltimore.

Baltimore, 455,427 : The total deaths during June were 711 —a decrease of 137 compared with the corresponding month of June, 1892. Of these 553 were whites and 158 colored—a death-rate of 17.28 per 1000 for the former and 26.71 per 1000 for the latter. The death-rate per 1000 for the whole population was 18.75. Twenty-five died from infectious diseases, 95 from consumption, 30 from pneumonia, 12 from bronchitis, 71 from cholera infantum ; 307, or 43.17 per cent of the total deaths, were in children under five years of age.

During the month 132 cases of infectious diseases were reported—a decrease of 228 compared with the preceding month.

MASSACHUSETTS.—S. W. Abbott, M.D., Secretary, Boston.

Boston, 469,647 : S. H. Durgin, M.D., Chairman.

There were 1010 deaths reported in May, of which number 292 were under five years of age. The annual death-rate per 1000 was 25.80. There were 134 deaths from zymotic diseases, and 111 from consumption.

MICHIGAN.—Henry B. Baker, M.D., Secretary, Lansing.

For the month of June, 1893, compared with the preceding month, diarrhœa increased, and pneumonia, influenza, and scarlet-fever decreased in area of prevalence.

For the month of June, 1893, compared with the preceding month, the prevailing direction of the wind was southwest (instead of northwest), the velocity was less, the temperature was much higher, the rainfall at Lansing was 3.11 inches

more, the absolute and the relative humidity were considerably more, the day and the night ozone were less, and the height of ground above the water in the well at Lansing was seven inches less.

Compared with the average for the month of June in the seven years 1886–92, intermittent-fever was less prevalent in June, 1893.

For the month of June, 1893, compared with the average for corresponding months in the seven years 1886–92, the prevailing direction of the wind was the same (southwest), the velocity was slightly less, the temperature was higher, the rainfall at Lansing was 4.27 inches more, the absolute and the relative humidity were slightly more, the day and the night ozone were less, and the depth of earth above the water in the well at Lansing was seven inches less.

Including reports by regular observers and others, diphtheria was reported present in Michigan in the month of June, 1893, at eighty places; scarlet-fever at seventy-four places; measles at fifty-six places, and typhoid-fever at thirty-three places.

Reports from all sources show diphtheria reported at two places more; scarlet-fever at thirty-four places less; measles at twelve places less, and typhoid-fever at four places more in the month of June, 1893, than in the preceding month.

MINNESOTA.—C. N. Hewitt, M.D., Secretary, Red Wing.

From *Public Health* we quote the following for the month of May: Mortality from all causes, 730, in a population of 1,301,826, representing 908 localities.

Diphtheria and croup caused 31 deaths; enteric-fever, 18; scarlatina, 12; pneumonia, 77; and consumption, 88. Annual death-rate per 1000, 6.90.

St. Paul, 155,000: H. F. Hoyt, M.D., Commissioner, reports for the month of May a total mortality of 115, of which 58 were under five years of age. The death-rate per 1000 was 8.90. The number of deaths from zymotic diseases was 23; from consumption, 13.

Minneapolis, 209,000: E. S. Kelley, M.D., Commissioner.

During the month of May, 1893, there were 179 deaths, representing an annual death-rate of 8.56 per 1000. Zymotic dis-

eases caused 21 deaths, and consumption, 18. There were 60 deaths under five years of age.

MISSISSIPPI.—Wirt Johnson, M.D., Secretary, Jackson.

MISSOURI.—R. C. Atkinson, M.D., Secretary, St. Louis.

Kansas City, 132,716: E. R. Lewis, M.D., Sanitary Superintendent, reports for May a mortality numbering 131, of which 28 were under five years of age, and representing an annual death-rate of 11.64 per 1000. Zymotic diseases caused 9 deaths, and consumption, 16.

NEBRASKA.—F. D. Haldeman, M.D., Secretary, Ord.

NEW HAMPSHIRE.—Irving A. Watson, M.D., Secretary, Concord.

NEW JERSEY.—Ezra M. Hunt, M.D., Secretary, Trenton.

Hudson County, 292,574: C. J. Rooney, Clerk, reports for May 487 deaths, of which 191 were under five years of age. Annual death-rate, 23.0 per 1000.

From zymotic diseases there were 69 deaths, and from consumption, 55.

Paterson, 90,251: J. L. Leal, M.D., reports for May 121 deaths, of which number 37 were under five years of age. The annual death-rate was 16.0. There were 13 deaths from zymotic diseases, and 18 from consumption.

NEW YORK.—Lewis Balch, M.D., Secretary, Albany, reports in the *Monthly Bulletin* as follows:

There was an average daily mortality during May of 346, that of April having been 395, and of March 387, and of the four preceding months 364. The increase in mortality, which began in March, due to epidemic influenza, is yielding, but the number of deaths is higher than it was a year ago, and is apparently about 500 above the normal for the month, and may be attributed to a continuance of the epidemic of influenza, which during the three months appears to have caused about 4300 deaths. The falling off in the death-rate is most marked in the maritime district and least in the southern tier

district, where it appears to have been but little disturbed by the epidemic. The variations have been about equal, proportionately in the cities and in the rural districts. The usual spring increase in cerebro-spinal-fever has been greater than usual, and is limited almost entirely to the maritime district, where 138 of the 159 deaths occurred. The same is true of whooping-cough, which is causing three times as many deaths as a year ago in that district. Scarlet-fever, diphtheria, and measles are less prevalent than usual, and are distributed more uniformly throughout the State, deaths being reported from a considerable number of rural towns. Consumption caused 100 fewer deaths than in April, and deaths from local diseases are all diminished. There were 544 deaths from accidents and violence, which is an unusually large number. The death-rate of 150 cities and large towns was 21.90. The month was rainy, there being an excess of 2.02 inches of precipitation above the average, and rain falling on fifteen days. The average temperature was a little below the normal.

New York, 1,860,803 : Total deaths, 3941—1400 under five years. Death-rate, 24.90. Zymotic diseases per 1000 deaths from all causes, 168.27. Deaths from consumption, 474. There were 27 cases of typhus-fever in the Riverside Hospital May 27th, since which time, to July 1st, there have been admitted 29 cases. Of this number 20 have died and 31 have been discharged.

Brooklyn, 978,394 : Total deaths, 1796—662 under five years. Death-rate, 21.60. Zymotic diseases per 1000 deaths from all causes, 128.35. Deaths from consumption, 199.

Syracuse, 91,944 : Total deaths, 132—29 under five years. Death-rate, 17.23. Zymotic diseases per 1000 deaths from all causes, 136.36. From consumption, 19.

Albany, 98,000 : Total deaths, 191—41 under five years. Death-rate, 23.30. Zymotic diseases per 1000 deaths from all causes, 84.47. From consumption, 21.

Buffalo, 278,796 : Total deaths, 419—146 under five years. Death-rate, 17.35. Zymotic diseases per 1000 deaths from all causes, 119.05. From consumption, 46.

Rochester, 144,834 : Total deaths, 205—54 under five years. Death-rate, 17.00. Zymotic diseases per 1000 deaths from all causes, 65. From consumption, 21.

NORTH CAROLINA.—Richard H. Lewis, M.D., Secretary, Raleigh.

The summary in the *Bulletin* for the month of May is as follows: Twenty-seven towns with an aggregate population of 137,883, of which 56,335 are of colored people, reported 81 deaths of white persons and 102 of colored: total, 186; making the respective annual death-rates 12.1, 21.9, and 16.1 per 1000.

The deaths under five years numbered 19.

The chief causes of death were consumption, 16; heart diseases, 13; diarrhœal diseases, 34; pneumonia, 13.

NORTH DAKOTA.—F. H. DeVaux, M.D., Superintendent, Valley City.

OHIO.—C. O. Probst, M.D., Secretary, Columbus.

The *Monthly Sanitary Record* furnished the following report for the month of March: Ninety-five cities, towns, and villages, having an aggregate population of 1,365,291, returned 2088 deaths, of which number 569 were under five years of age. The annual death-rate was 17.07 per 1000. Zymotic diseases caused 305 deaths, and consumption, 277.

Cincinnati, 325,000: J. W. Prendergast, M.D., Health Officer, reports for June 472 deaths, of which 203 were under five years of age. Annual death-rate per 1000, 17.42. There were 87 deaths from zymotic diseases, and 58 from consumption.

Mansfield, 15,000: R. H. Reed, M.D., Health Officer, reports for June 8 deaths, of which 1 only was under five years of age.

Consumption caused 2 deaths; apoplexy, 2; meningitis, 1; diphtheria, 2; and scarlatina, 1. The annual death-rate was 6.0 per 1000.

OKLAHOMA TERRITORY.—J. O. Overton, M.D., Secretary, Kingfisher.

PENNSYLVANIA.—Benjamin Lee, M.D., Secretary, Philadelphia.

Philadelphia, 1,115,562: M. Veale, Health Officer, reports:

In the three weeks ending June 24th, 1893, there were 1259 deaths, of which number 462 were under five years of age. Annual death-rate, 19.6 per 1000. Deaths from consumption numbered 159.

Pittsburg, 255,000: J. Guy McCandless, M.D., Registrar, reports: During the four weeks ending June 24th, 1893, there were 447 deaths, of which 245 were under five years of age. Annual death-rate, 22.79 per 1000. Zymotic diseases caused 120 deaths, and consumption, 38.

RHODE ISLAND.—C. H. Fisher, M.D., Secretary, Providence, reports for the month of May 525 deaths in a population aggregating 323,418. Annual death-rate, 19.44 per 1000. There were 57 deaths from zymotic diseases, and 53 from consumption.

SOUTH CAROLINA.—H. D. Frazer, M.D., Secretary, Charleston.

SOUTH DAKOTA.—C. B. Alford, M.D., President, Huron.

TENNESSEE.—J. Berrien Lindsley, M.D., Secretary, Nashville.

The principal diseases, named in the order of their greater prevalence, in the State for the month of May were: Whooping-cough, malarial-fever, consumption, dysentery, typhoid-fever, diphtheria, rheumatism, scarlet-fever, mumps, measles, tonsilitis, and pneumonia.

Whooping-cough was reported in the counties of Bradley, Davidson, Dickson, Hamilton, Houston, Humphreys, Maury, Montgomery, Moore, Robertson, and Williamson. Consumption in Anderson, Davidson, Hamilton, Knox, Montgomery, Shelby, and Weakley. Typhoid-fever in Anderson, Hamilton, Humphreys, Moore, Shelby, and Williamson. Diphtheria in Davidson, Henry, Knox, Shelby, and Wilson. Scarlet-fever in Davidson, Hamilton, Knox, and Shelby. Mumps in Anderson, Dickson, Humphreys, and Williamson. Measles in Bradley, Henry, Houston, and Montgomery. Cerebro-spinal meningitis in Bledsoe, Henry, and Weakley.

Chattanooga, 27,000 white and 13,000 colored : Total deaths, 35—18 of which were colored, and 11 under five years of age. Annual death-rates, 7.55 for the white population, and 16.51 for the colored, per 1000.

Knoxville, 31,273 white and 9112 colored : Total deaths, 45—13 of which were colored, and 21 under five years of age. Annual death-rates, 12.27 white, and 17.12 colored, per 1000.

Memphis, 33,800 white and 27,700 colored : Total deaths, 84—53 of which were colored, and 31 under five years of age. Annual death-rates, 11.00 white, and 22.99 colored, per 1000.

Nashville, 54,595 white, 33,159 colored : Total deaths, 130—79 of which were colored, and 40 under five years of age. Annual death-rates, 11.20 white, and 28.58 colored, per 1000.

WASHINGTON.—G. S. Armstrong, M.D., Secretary, Olympia.

WEST VIRGINIA.—N. D. Baker, Secretary, Martinsburg.

WISCONSIN.—J. T. Reeve, M.D., Appleton.

Milwaukee, 250,000 : U. O. B. Wingate, M.D., Commissioner, reports for the month of May 371 deaths, of which 185 were under five years of age. Annual death-rate per 1000, 17.80. From zymotic diseases there were 87 deaths, and from consumption, 22.

PROVINCIAL BOARD OF HEALTH OF ONTARIO.—Peter H. Bryce, M.D., Secretary, Toronto.

PROVINCE OF QUEBEC.—Elzear Pelletier, M.D., Secretary, Montreal.

BUENOS AYRES, 554,713 : Albert B. Martinez, Director-General of Municipal Statistics.

The mortality during the month of April was 974, of which number 478 were under five years of age. From epidemic diseases there were 98 deaths, and from consumption, 76.

EDITOR'S TABLE.

SANITARIAN, AUGUST NUMBER, 1893.

☞ALL correspondence and exchanges and all publications for review should be addressed to the Editor, DR. A. N. BELL, Brooklyn, N. Y.

CROTON WATER "IMPURITIES ARE COLLECTING RAPIDLY," as reported at the time of this writing, means that—

The *constantly accumulating impurities* of the Croton Water are, as usual, under the influence of the summer heat, undergoing rapid putrefaction. "This working of the water"—not the impurities—"Chief Engineer Birdsall says" (*Herald*, July 15th), "is responsible for the filthy condition of Croton Lake!" . . . "This happens almost every year, and when nature stops its purifying process the water will become clear again."

Meanwhile, the processes of pollution are permitted to go on, as they have been for many years, with circumstantial evidence of their fatal effects strong enough to convict the responsible parties of murder in any court of justice—the persistent mortality, *pari passu*, from typhoid-fever and other intestinal diseases that cannot be otherwise accounted for by the health authorities.

The external appearances are indeed abominable, and the reader's attention is again invited to them, as represented in our May number, since which time they have been raided to some extent—and another raid is promised—but they are as nothing compared to the worse conditions that are wholly ignored.

Although by every rainfall the washings of the surface filth —the manure of more than twenty thousand horses and cattle and twice that number of hogs and domestic fowls—flow into the tributaries of the Croton, the danger from this source of pollution is trivial compared to that which is under the surface. Thousands of house drains, cesspools, and privy vaults,

of the thirty thousand people who occupy the water-shed pollute the soil ; and more revolting and worse than all these is *the seepage of thousands of human corpses,* continually being added to daily, at an average of upward of five hundred annually ! And all these human dead bodies, it seems hardly necessary to state, are, according to custom, carefully protected from contact with the earth, while they are exposed to rain soakage from the surface, and at the most favorable depth for the sweep of the subsoil currents. Clearly the Croton Lake is the common receptacle of every liquid product and of everything that is soluble, resulting from the putrefaction of human dead bodies buried in the Valley, as well as that of the surface filth and of the thousands of privy vaults and cesspools tolerated there.

That *Nitrifying Bacteria* should swarm in the Croton Lake during hot weather is perfectly consistent with their beneficent purpose in nature. Such bacteria are universally distributed, and their office is to decompose organic matter and convert it into its simplest constituents. Under their operation it is split up into its original elements, its nitrogen becomes converted into ammonia, and thence into *nitrites,* and eventually *nitrates* are produced. They act most vigorously in soil and water under a temperature of 90° to 96° F., hence the observation of Chief Engineer Birdsall that the Croton " works" almost every year during the hot weather. But, alas ! he takes no account of the filth that is there all the time, while the Health Department ignores the circumstantial evidence of its presence, and depends upon the demonstration made by the nitrifying bacteria, which, though not themselves pathogenic—disease-producing—serve to show the pabulum for those that are.

The presence of nitrites in water indicates that *there has been* recent pollution with organic matter. Nitrites are the result of organic matter *acted upon* by nitrifying bacteria. There may be, and particularly in cool weather, much organic matter present, and yet no nitrites discoverable ; but with regard to the Croton, no such evidence is necessary. Its pollution is common knowledge ; and it is incredible from a sanitary point of view, that the health authorities of the City and State, with the plenary power of the Governor behind them, can longer tolerate these pollutions, no matter what the prom-

ises of interested parties to render them harmless by "electrolysis" or any other treatment. *The pollutions should be prevented.*

The burial of the dead in the Croton Valley should be forthwith and ever hereafter prohibited.

House drainage and sewerage should be concentrated at a rendering depot, from which seepage to the soil should be prevented, and the sewage there converted into harmless manure.

All surface refuse should be cremated.

The keeping of privy vaults and cesspools, or any other means of polluting the soil or water, should be made criminal offences.

NATIONAL HEALTH SERVICE.

Gratifying to every sanitarian as must be the success of Surgeon-General Wyman in securing the co-operation of the State Health Officers, under the new quarantine law, it is none the less evident that the sensus of medical opinion throughout the country is that a more comprehensive law is necessary.

On other pages will be found the reports of the committees of the American Medical Association and of the New York Academy of Medicine, urging national legislation to the same end, but by widely different methods. That of the Association is persistent, though twice refused consideration by the Senate Committee on Epidemic Diseases and generally disapproved by practical sanitarians.

The proposed bill by the Academy is surprising considering the committee, some of the members being well recognized sanitarians known to be familiar with state and national sanitary efforts. It comprehends the same discordant and ultimately destructive elements of the whilom National Board, and almost ignores the State Boards of Health—leaves their recognition to the pleasure of the President of the Commission —and seems by its elaboratness to provide against their necessity.

We believe that a much better proposition would be :

That there shall be established within the Treasury Department a National Board of Health, to consist of seven members, all of whom shall be sanitary scientists, appointed by the President, by and with the advice of the Senate, chosen one

each from the seven Judicial Districts of the Supreme Court, who shall devote the whole of their time to the duties of their office, and who shall receive salaries of five thousand dollars per annum. There shall be an Advisory Council of the Board, consisting of the Surgeon-General of the Army, Surgeon-General of the Navy, and the Supervising Surgeon-General of the Marine Hospital Service, and the Executive Officers of the State Boards of Health, who shall be required to meet with the National Board at least once a year, and as much oftener as the President may direct for council and advice ; but the members of the Advisory Council, being salaried officers, shall receive no compensation other than their travelling expenses.

That the members of the Board shall meet at such time and place as may be designated by the Secretary of the Treasury, and organize by the election from their own number of a President and a Secretary ; and the Board shall proceed to appoint and equip bureaus or special departments and make all needful rules and regulations for their control, and for the guidance and discipline of all their employés ; and shall establish all rules and regulations for the government of national sanitation in its interstate and international relations, in the enforcement and provisions of this Act.

All questions of law shall be referred to the Department of Justice.

ARMY MEDICAL SCHOOL.

Surgeon-General STERNBERG, the new Chief of the Medical Department of the Army, has promptly instituted measures looking to the establishment of two important changes for the benefit of that service. One is the establishment of a special course of training for newly appointed officers of the corps. This course will be given in Washington, and will constitute what will be known as the Army Medical School. It will be conducted in the Army Medical Museum, and will be of four months' duration. Four of the senior medical officers stationed in the city will, in addition to their other duties, conduct this course.

Course of Instruction.—One of the officers will act as president of the faculty, and will lecture upon the duties of a medical officer in time of peace and war, the methods of conduct-

ing official correspondence, making reports to the department, the discharge of soldiers on certificates of disability, the examination of recruits, the rights and privileges of medical officers, their relations to other officers and the customs of the service. His associates on the faculty will deal respectively with the subjects of military surgery, of military hygiene and of clinical and sanitary microscopy. The course will be a practical one, and include laboratory work, with the idea of making the young medical officer familiar with the most accurate methods of the sanitary examination of the air, water and food, the recognition of known disease germs, the microscopic examination of morbid growths, etc.

Assignment of Officers.—The other project of General Sternberg is to give the officers of the medical corps the advantages accruing from metropolitan life. He proposes to change the system of assigning medical officers for duty as attending surgeons in the large cities. It has been the custom heretofore to detail for this purpose the older medical officers of the army. The duty usually lasts three or four years. In some cases it has lasted ten or a dozen years. The duty of the officer so detailed is to attend army officers and their families in and about the city of his location. Dr. Sternberg will hereafter detail medical officers having the rank of captain to duty as attending surgeons. The tour of duty will last only one year. By this system the medical officer selected will be enabled to become familiar with the practice of the leading physicians and surgeons in this country and to attend medical lectures and meetings of medical societies. The experience and observation will fit them the better for their second examination, which is required by law before they can be promoted to majorities.

The details will be made in Boston, New York, Philadelphia, Baltimore, Chicago, St. Louis, and San Francisco. The senior medical officers who have heretofore been stationed in several of these cities as attending surgeons will be required to perform the more responsible duties of post surgeons at the larger military posts, where, as a rule, one or more younger officers will also be stationed as assistants. This policy will not only give the younger men of the medical corps better opportunities for professional advancement, but it will give

them the benefit of the experience of their seniors and of the necessary instructions and discipline which so often in the past they failed to receive. This failure is due to the fact that they were stationed usually at remote frontier posts and were thrown upon their own responsibilities before they had the opportunity to make themselves familiar with the special duties of the medical officer of the army and the customs of the service.

Both of these plans have received the approval of Secretary LAMONT, and steps will be taken to put them into execution as soon as practicable.

The Order for the School.—A general order providing for the establishment of the Army Medical School was issued by Adjutant-General Williams on June 26th as follows :

By direction of the Secretary of War, upon the recommendation of the Surgeon-General of the Army, an army medical school will be established in the city of Washington for the purpose of instructing approved candidates for admission to the Medical Corps of the Army in their duties as medical officers.

The course of instruction will be for four months, and will be given annually at the Army Medical Museum, in Washington city, commencing on November 1st.

Four professors will be selected from among the senior medical officers of the army stationed in or near the city of Washington, and as many associate professors as may be required to give practical laboratory instruction in the methods of sanitary analyses, microscopical technique, clinical microscopy, bacteriology, urine analysis, etc.

The faculty of the Army Medical School will consist of :

1. A president of the faculty, who shall be responsible for the discipline of the school, and who will deliver a course of lectures upon the duties of medical officers in war and peace (including property responsibility, examination of recruits, certificates of disability, reports, rights and privileges, customs of service, etc.).

2. A professor of military surgery (including the care and transportation of wounded).

3. A professor of military hygiene (including practical instruction in the examination of air, water, food and clothing from a sanitary point of view).

4. A professor of clinical and sanitary microscopy (including bacteriology and urinology).

THE PENNSYLVANIA QUARANTINE LAW.

The Bliss quarantine law has received the approval of the governor. As finally passed, it embraces the following features :

First. In view of the prospective establishment at an early date of a thoroughly equipped and effective Federal marine quarantine on the Delaware Bay or River, the Governor of the State of Pennsylvania is empowered, when satisfied that the United States has established and is maintaining on the Delaware Bay, etc., an effective and sufficient quarantine to secure this commonwealth against the introduction of pestilential, contagious and infectious diseases, the Governor is empowered to suspend by public proclamation the operation of State quarantine in part or in whole, at his discretion.

Second. The Governor is empowered under certain circumstances to lease the Lazaretto Station, which station, however, must be discontinued for quarantine purposes after July 1st, 1895.

Third. The Governor is authorized to acquire, by purchase, etc., a suitable place on the Delaware River or Bay either within or without the limits of Pennsylvania, for the establishment of a permanent quarantine station.

Fourth. The State Quarantine Board is to be constituted as follows :

1. The Secretary of the State Board of Health.

2. The President of the Philadelphia Maritime Exchange, or a member of said exchange to be designated by him.

3. The President of the College of Physicians of Philadelphia, or a member of said college to be designated by the President.

4. The Quarantine Physician provided for in this act.

5. The Health Officer appointed in pursuance of the act to which this is a supplement.

6. The sixth member to be appointed by the Governor of Pennsylvania.

7. The seventh member to be appointed by the Mayor of Philadelphia.

The members of said board serving for various terms, so that all shall not go out at one time.

Fifth. The State Quarantine Board thus constituted shall make rules and regulations not inconsistent with the laws of the United States and this commonwealth for the regulation and management of the Quarantine Station, etc.

Sixth. The Quarantine Board shall establish an office in the city of Philadelphia.

Seventh. The Quarantine Physician shall be the executive officer of the Quarantine Station.

Eighth. The time the act is to go into effect is July 1st, 1893, from and after which date the offices of the Lazaretto Physician and Quarantine Master shall cease to exist.

Ninth. Section 13 provides that the power of the Philadelphia Board of Health over maritime quarantine ceases when this act goes into effect.

An appropriation of thirty-five thousand dollars ($35,000) toward the cost of securing a site and equipping same, in conformity with the requirements of this act, was passed during the last days of the legislative session.

The value of the measure, as remarked by the *Times and Register*, will depend altogether on the personnel of the board. Dr. Lee has done such good work as a sanitarian that his efficiency may be safely assumed.

Ground Coffee in Rio.—Most people would imagine that it would hardly pay to adulterate coffee in Rio Janeiro, the chief port of the great coffee-producing republic of Brazil, but the Rio *News* says: "An interesting result has been discovered of the high prices of coffee ruling in Brazil; the police have 'raided' some half a dozen establishments professing to sell ground coffee, and found no coffee on the premises, the stock in trade consisting of Indian corn and *carnauba* beans." In another column the same journal says: "Yet another coffee roaster, who employs Indian corn in his business, was arrested. What in the world have we been drinking in Rio under the name of coffee?"

LITERARY NOTICES.

PHYSICIANS AND THEIR CONGENERS IN NEW YORK, NEW JERSEY, AND CONNECTICUT. The *Medical Register* for these three States, for 1893–94, just issued by G. P. Putnam's Sons, edited by WILLIAM T. WHITE, M.D., under the auspices of the New York Medico-Historical Society, contains the names of 8505 physicians, as follows: In New York City, 2550; Brooklyn, 823; and in the State, exclusive of the cities of New York and Brooklyn, 3532; New Jersey, 1019; Connecticut, 624.

The New York City list is admittedly incomplete, there being about nine hundred other physicians of various grades and kinds. Yet the figures show an increase of physicians in this city during the past nine years of 761, and in the State, outside of New York and Brooklyn, of 854. The ratio in this city has been about one hundred more proportionately than in the rest of the State. The population in the past nine years has increased just one half a million—*i.e.*, from 1,356,958 to 1,827,396.

To provide for this half-million increase there has been an increase of 761 in the regular physicians, besides a good many others of not sufficient standing to get into the "Green Book." This means one new physician for every 650 new arrivals, and as thousands of new arrivals are poor immigrants, the supply is quite sufficient to meet all demands.

The annual loss by death from the city list is over forty; the number that move away or give up practice is not known, but in 1889 it was 70; the average annual increment over and above losses is 93; so that it may be said that between 200 and 250 new practitioners begin in the city of New York annually, and like proportions prevail in Brooklyn; but the ratio to population in Brooklyn is considerably less than in New York. Moreover, the proportion of hospitals and dispensaries where patients are treated gratuitously is much greater in New York than in Brooklyn. According to the

reports of the different hospitals and dispensaries of New York City for 1892, more than 35,000 were treated in the hospitals, and upward of 600,000 were treated in the dispensaries. Notwithstanding, the average *collections* of Brooklyn physicians for their service are probably less than of first-class mechanics.

In New Jersey and Connecticut, like the smaller cities and the State of New York, exclusive of the City and Brooklyn, the *clientèle* is larger and the physicians are proportionally better off.

The *Register* is also a fruitful source of information with regard to dentists, pharmacists, and nurses, medical and dental societies, colleges, hospitals, homes, eleemosynary institutions, medical libraries, and booksellers.

THE HEALTH RESORTS OF EUROPE. By THOMAS LINN, M.D., Member of British Medical Association; Société de Médicine Pratique de Paris; Société de Médicine et Climatologie de Nice, etc. New York: D. Appleton & Co.

This is a medical guide-book to and manual of the mineral springs and other health resorts of England and the Continent. It gives a brief classification of the mineral springs and a concise account of the sensible properties of their waters without analyses, but sufficient to indicate their therapeutical application. It describes the earth, mud, sand, grape and milk treatments to be found at various places, gives the routes of travel, names of the best hotels, accommodations and prices, physicians resident, and much other information of practical utility to all who would avail themselves of the best conditions for obtaining the fullest benefit of the sanitary resorts of Europe.

MASSAGE is among the most useful of recently revived old remedies for several diseases less curable by other means. After two or three centuries' effectual use by the most accomplished physicians of the time, under the evolution of physic massage was well-nigh relegated to "miracle workers" and other quacks—the ancient practitioners of "Christian science"—insomuch that until recent years, under the progress of physiological knowledge, physicians, with few exceptions, had eschewed it.

Two years ago we had occasion to review an elaborate treatise on the subject. We now have before us a brief summary, supplementary to that work, by the same author, DOUGLAS GRAHAM, M.D., of Boston, Mass., under the title of "Recent Developments in Massage." It is illustrated by the citations of many apt cases, showing the scope and usefulness of massage based upon scientific knowledge. Price, 25 cents. George S. Davis, Detroit, Mich.

PAMPHLETS, REPORTS, ETC., RECEIVED.

Clinical Study of the Ocular Symptoms Found in the So-called Mongolian Type of Idiocy. Charles A. Oliver, M.D., Philadelphia, Pa.

Orthopedic Surgery, Scope of, etc.

Tubercular Ascesses and their Treatment. Stewart LeRoy McCurdy, M.D., Dennison, O.

Typhoid-Fever in the Light of Modern Research.

Facts and Doubts about Cholera, with two Phototypes. L. Bremer, M.D., St. Louis, Mo.

Chancre of the Mouth. E. Harrison Griffin, M.D. New York.

Necessity of Amputation of the Cervix Uteri in a Certain Class of Cases of Laceration. J. W. Hyde, M.D., Brooklyn, N. Y.

Clinical Study of Cholera, Treated by Hyperdermoclysis and Enteroclysis. Judson Daland, M.D., Philadelphia, Pa.

Drainage Tubes and Ligatures and the Possibilities of Skin Disinfection Based upon Bacteriological Investigations. Hunter Robb, M.D., Baltimore, Md.

Hysteomyomectomy for Large Myomata of the Uterus. *Ibid.*

Cosmetic Surgery of the Nose. John B. Roberts, M.D., Philadelphia, Pa.

Intra-Cranial Neurectomy of Second and Third Divisions of Fifth Nerve. *Ibid.*

Tumor of the Liver in which Removal was Attempted. *Ibid.*

Variations in Typhoid-Fever. Samuel A. Fisk, M.D., Denver, Col.

THE ELEVENTH INTERNATIONAL CONGRESS OF MEDICINE.

ROME, SEPTEMBER 24TH–OCTOBER 1ST, 1893.

PROFESSOR G. BACCELLI, President, Rome.

Professor L. PAGLIANI, Treasurer, Rome.

Professor E. MARAGLIANO, Secretary-General, Genoa.

The inauguration of the Eleventh International Congress will take place September 24th, 1893, in the presence of His Majesty the King of Italy.

The work of the Congress will begin in the nineteen sections on the morning of September 25th. It will be continued in accordance with the arrangements to be made and published both for the general sessions and the sections. Some of the general sessions will be devoted to scientific addresses delivered by scientists of all nations.

LIST OF THE SERIES.

1. Anatomy; 2. Physiology; 3. General Pathology and Pathological Anatomy; 4. Pharmacology; 5. Internal Medicine; 6. Diseases of Children; 7. Psychiatry, Neuropathology and Criminal Anthropology; 8. Surgery and Orthopedy; 9. Obstetrics and Gynæcology; 10. Laryngology; 11. Otology; 12. Ophthalmology; 13. Odontology; 14. Military Medicine and Surgery; 15. Hygiene; 16. Sanitary Engineering; 17. Dermatology and Syphilidology; 18. Forensic Medicine; 19. Hydrology and Climatology.

REGULATIONS.

1. The Eleventh International Congress of Medicine will be inaugurated in Rome on September 24th, 1893, and will close on October 1st.

2. Any physician may become an active member of the Congress by fulfilling the conditions of membership, inscribing his name, and securing his admission ticket.

3. Scientists of other professions who, through their special studies, are interested in the labors of the Congress, may ac-

quire the rights and assume the duties of active members, and participate in the work of the Congress, both by communications and discussions.

4. The fee for admission to the Congress is twenty-five francs, or five dollars.* It entitles to a copy of the Transactions of the Congress, which will be forwarded to the members immediately after publication.

5. The character of the Congress is strictly and exclusively scientific.

6. The work of the Congress will be divided among nineteen sections ; every member is requested to indicate, on paying his admission fee, the section for which he desires to be inscribed.

7. The provisional committee will arrange the appointment, in the opening session, of the permanent officers. They will be a president, three vice-presidents, a number of honorary presidents and secretaries. Each section will elect, in its first meeting, its president and a certain number of honorary presidents, who shall alternately take the chair during the session. Some of the secretaries will be chosen from among the foreign members in order to facilitate the recording both of communications and of discussions in the different languages.

8. There will be daily sessions, either general or sectional. The times and numbers of the general sessions, and the business to be transacted in them, will be arranged by the President of the Congress.

9. The general sessions are reserved, (*a*) for the consideration of the common work of the Congress and of its common interests ; (*b*) for addresses and communications of general interest and importance.

10. The addresses in the general sessions, and in such extraordinary sessions as may be arranged, will be delivered by members chosen by the committee for the purpose.

11. Papers for and communications to the Congress must be announced on or before June 30th, 1893. A brief abstract of every paper and communication, with their conclusions, must be sent to the committee on or before July 31st. All of them will be printed and distributed to the members by

* Money order or check to the Treasurer, Professor Comm. L. Pagliani, Rome, Italy.

authority of the president. Such as arrive after that date cannot be expected to find a place on the regular order of business, and will be accepted only if time will permit.

12. The business of the sections will be arranged by their presidents, who will also determine the hours of meeting, avoiding those reserved for the general sessions. Two or more sections may hold joint meetings with the consent of their presidents. There will be no vote on scientific questions.

13. Fifteen minutes are allowed for the reading of a paper or communication. In the discussion every speaker can have the floor but once, and for five minutes only. To close the discussion the author of the paper is allowed ten minutes. Additional time may be given him by the president, by special resolution of the section, if the importance of the subject under discussion appear to require it.

14. The manuscript of all addresses, papers, and communications read either before a general session or a section must be handed to the secretary before the close of the meeting. A special committee on publication appointed by the president will decide which or what part of them shall be published in the Transactions of the Congress. Such members as participated in the discussions are required to hand to the secretaries their remarks, in writing.

15. The official languages of the sessions are Italian, French, English, and German. The regulations, programmes, and daily bulletins will be published in the above four languages. During the meetings, however, a member may be permitted to use, for a brief remark, any other language provided some member present expresses his willingness to translate such remarks into any of the official languages.

16. The president directs the discussions according to the parliamentary rules generally obeyed in similar assemblies.

17. Persons not classified under Article 3, who are interested in the labors of a special section, may be admitted by the President of the Congress. They will receive a special ticket on paying their admission fee ; will not be entitled to a copy of the Transactions ; and cannot speak in the general sessions nor in any section other than that for which they were inscribed.

18. The president may invite or admit students of medicine to attend and to listen. They will be given a special admission ticket, free of charge.

GENERAL INFORMATION.

Journeys and Reduction of Fares.—The provisional committee has made arrangements with the different Italian and foreign railway and navigation companies, in pursuance whereof special reduced prices have been granted on the steamers and railways of this country and of the countries which the members of the Congress are to traverse.

In Italy the members of Congress will find tickets for round trips, starting from Rome; they will thereby be enabled to visit the most important cities and the various universities. In regard to this, further notice will be given.

The Ladies of the Members will be furnished ladies' tickets, which will entitle them to the reduced fares granted to the members, and to participate in the festivities connected with the Congress.

Festivities.—Besides the receptions which the kind and hospitable citizens of Rome will offer to the members, the Italian colleagues will endeavor to return to the best of their power the kindness they experienced during their stay abroad.

On some evening yet to be decided, the members of the different sections will join at a dinner, which will be given in one of the first hotels of Rome.

The Italian physicians have formed special committees to show the most hearty and kindly hospitality toward the foreign colleagues.

International Exhibition of Medicine and Hygiene.—On the occasion of the Eleventh International Medical Congress, an exhibition of medicine and hygiene will be inaugurated in Rome, which will gather all that may practically interest physicians and specialists. A special committee has already insured the co-operation of all the most important manufacturers of the world.

Hotels.—All the first and second-class hotels of the Italian capital will afford to the members, during their stay, all desirable comforts.

The undersigned, Chairman of the American National

Committee, offers his services to whosoever will direct him to forward both application and fee.

A. JACOBI,
110 West Thirty-fourth Street, New York.

ORGANIZATION OF THE PAN-AMERICAN MEDICAL CONGRESS.

TO BE HELD AT THE CITY OF WASHINGTON, D. C., SEPTEMBER 5TH, 6TH, 7TH AND 8TH, A.D. 1893.

PROFESSOR WILLIAM PEPPER, M.D., LL.D., of Philadelphia, President.

The details of the organization are set forth in the published preliminary announcement of the Congress, heretofore published.

Since the publication of this preliminary announcement an organization has been effected in Paraguay. Your committee is therefore pleased to state that an organization of the Pan-American Medical Congress exists in every State and Territory of the United States, and in every remaining country and colony of the Americas, including the West Indies and Hawaii.

A provision has been adopted since the foregoing publication whereby every medical society, national, colonial and local, has been made a constituent organization of the Congress.

The National Congress at its last session appropriated fifteen thousand dollars ($15,000) for the purposes of entertainment of the meeting.

The President of the United States has consented to open the Congress in person and to extend the courtesy of a reception at the White House to delegates and their families.

A special feature of the Congress will be the proceedings of the sections on Hygiene, Climatology and Demography, and on Marine and Hygiene and Quarantine. The proceedings of these sections will be largely of the nature of a sanitary

conference, with particular reference to practical questions of public health and of imminent importance.

With this object in view, every municipality of the three Americas, including the West Indies and Hawaii, has been invited to send an official delegate, and a very large number of acceptances have already been received.

The titles of several hundred papers, accompanied in many instances with abstracts, have already been received from representative medical writers in the English, Latin, French, and Portuguese countries. This, of itself, assures the scientific success of the Congress.

Invitations have been extended to representative European scientists to be the guests of the Congress, and a number of acceptances have been received.

In conclusion, your committee begs leave to express its appreciation of the spontaneous response to its appeal for funds in the form of advance registration fees from the public-spirited representatives of our profession in America. Let it be remembered, no registration fees will be accepted from members of the Congress residing outside the United States. Although money has been realized from advance registrations in amount sufficient to pay some of the preliminary expense of organization, a still larger sum is needed with which to meet accumulated obligations.

It should be held in mind that the Congressional appropriation, meagre as it is, will be available only for purposes of entertainment at the time of the meeting, and that the expense involved in publication, correspondence, and clerical work is necessarily very heavy and must be met at once. The members of the profession are therefore again urgently requested to register at once by paying the fee ($10) to the treasurer, Dr. A. M. Owen, Evansville, Ind. Those who thus become members of the Congress, but who may be prevented from attending the meeting, will receive a set of the transactions, which, of themselves, promise to be worth more than the amount of the registration fee.

Respectfully submitted on behalf of the committee,

CHARLES A. L. REED, *Chairman.*

THE SANITARIAN.

SEPTEMBER, 1893.

NUMBER 286.

THE EXTINCTION OF CONTAGIOUS DISEASES.

ADDRESS ON STATE MEDICINE, DELIVERED BEFORE THE AMERICAN MEDICAL ASSOCIATION AT THE FORTY-FOURTH ANNUAL MEETING HELD AT MILWAUKEE, JUNE, 1893.

By WALTER WYMAN, A.M., M.D., Supervising Surgeon-General of United States Marine Hospital Service.

IS the idea utopian or has the time come in the history of the world when it should be considered a rational thought, worthy of serious contemplation? When a standard so lofty as this should be raised, and around it gather physicians, sanitarians, and philanthropists fully determined upon a great struggle and animated by a reasonable confidence in ultimate success?

Concerning the *great epidemic* diseases, encouragement may be found both by a reasoning from analogy, in the study of their respective histories, and in the contemplation of modern knowledge and methods.

The history of the world shows us that whole races of men and other animals have become extinct. Why should not races of microbes become extinct? And certain diseases that once ravished the earth in epidemic form have so lost their inherent strength or have been so controlled in the latter part of the nineteenth century as to warrant the belief that their histories are closed, or fast closing. The plague of Athens and the plague of the second century are unknown at the present time; and the terrible black death of the fourteenth century it is unreasonable to suppose can ever again sweep from the face of the earth 25,000,000 of its inhabitants within a century.

The terrible bubonic plague since the introduction of quarantine, crude though the first quarantines were, has gradually receded from Europe, its last appearance on European soil being in 1878, when the Russian Government by means of military cordons and destruction of infected villages by fire succeeded in stamping it out. Though it still occurs in Asia it may never again obtain a serious foothold in Europe because of more perfect quarantine and improved sanitation.

With regard to yellow-fever the *great* period of *its* history was from 1732 to 1805. Formerly it was of common occurrence in Europe, the ports of Spain in particular suffering severely between 1801 and 1825, but there has been no disastrous epidemic of this disease in Europe since that of Lisbon in 1857, thirty-six years ago.

Its earlier history in this country includes invasion not only of the South, but of parts as far north as Pennsylvania, New Jersey, New York, and even New Hampshire. But to-day, though constant vigilance against its introduction is necessary, it has practically vanished from the ports of the United States.

Formerly epidemics of this disease were so frequent in the city of New Orleans that the belief became quite prevalent that it was natural to the soil, but under the excellent quarantine service, and the modern quarantine appliances of the Louisiana State Board of Health, there is now a record of fourteen years' exemption from this dreaded pestilence. The last epidemic in the United States was that in Florida in 1888, when, by reason of intelligent restraints, it was prevented from spreading to other States. Since that date an efficient State Board of Health for Florida has been established, and under its vigorous management the disease has been barred out. Even in the West Indies some ports formerly affected are now exempt, and with careful sanitation and sanitary engineering all might be freed, and this dread disease become as certainly a matter of history only, as the African slave trade with which it was intimately associated. In South America, Rio Janeiro is its principal breeding-place, but the disease was unknown there until 1849. Why should it not again become unknown?

Since the discovery of vaccination by Jenner in 1796 smallpox, though still a stubborn foe, no longer devastates without

restraint. It is now simply a matter of choice whether one shall be made absolutely proof against this disease, and the good effects of a compulsory law regarding vaccination are seen in the statistics of Prussia, in which country for six years prior to the enforcement of vaccination the deaths from small-pox averaged 85 per 100,000 of the inhabitants, while from 1875 to 1886, after the law came into force, the yearly average was but 2 per 100,000.

Typhus-fever flourishes to-day in certain parts of Mexico, and is occasionally reported from the old world. It is always a menace where large numbers of people are crowded together with unsanitary surroundings. But it has no permanent lodgment in the United States, and the energetic and successful measures instituted by the Board of Health of New York during the past winter to suppress this disease, although it appeared in a section of the city more densely populated than that of any other city in the world, is a striking example of what may be accomplished by proper law, energetic execution, and scientific disinfection.

The Japanese have recently illustrated how a disease, commonly thought to be infectious, may be eliminated by scientific investigation and the application of a proper remedy. Prior to 1884, beriberi was the scourge of the Japanese navy. During a period of six years prior to 1884 there were 9516 cases reported, while for a second period of six years, from 1884 to 1889 inclusive, there were but 765 cases, of which 718 occurred in 1884, which was the year in which the remedy, relating to a change in the character of the food furnished, was applied. In 1887 there was not a single case reported in the entire navy of 9000 men; and the New York *Medical Record* aptly remarks that "this is one of the great victories of science, and lends good grounds to the hope that beriberi may before long become a rare or even unknown disease in the Mikado's dominions."

With regard to cholera, which is still an ever-threatening menace, the history of the past few years has demonstrated most clearly its relation to filth and to contaminated food and water, both of which conditions require only the peculiar energy and love of cleanliness characteristic of the Anglo-Saxon race. In recent years the superior sanitation of Eng-

land and the more perfect quarantine surveillance of the United States have served to protect these two nations from this exotic disease.

One possible agency in the elimination of these diseases, still young as a science but not without promise, is protective inoculation. Whatever opinion may be held of Freire's inoculations for yellow-fever and Kitisato's and Haffkine's inoculations for cholera, the investigations of these and other bacteriologists in this particular field warrant the hope that results will be attained equal in efficiency to vaccination for variola. But be this as it may, the nature of these diseases is now so well known that they no longer strike terror in the hearts of those whose duty it is to meet and combat them, and never before has human agency had within its grasp the weapons known to be efficient in preventing their spread. The *terra incognitus* no longer exists, and we have but to provide ourselves with the weapons, and manifest the energy to wield them, to combat successfully these microbic armies hostile to human life. As to the *United States*, the time is at hand when we may expect that no more shall cholera, typhus, yellow-fever, or small-pox prevail in epidemic form. Never before have our ports been provided, as now, with protective armaments—the ordnance, so to speak, of sanitary defence. The great power of steam has been invoked, and along the coast from Portland, Me., to Port Townsend, Wash., where ten years ago not a single port was provided with a steam disinfecting chamber, there are now twenty-three ports with steam chambers in actual operation or in course of construction. These ports are : Portland, Boston, New York, Sandy Hook, Delaware Breakwater, Reedy Island in the Delaware River, Cape Charles, Baltimore, Wilmington, N. C., Savannah, Blackbeard Island, Ga., Charleston, Dry Tortugas, Key West, Mullet Keys, Pensacola, Mobile, Chandeleur Islands, New Orleans, Galveston, San Diego, San Francisco, and Port Townsend ; of these ten are national quarantine stations.

In *support* of the quarantine plants are *laws*, both national and State, that are sufficient ; but should perchance contagion pass this line, it meets with forces ready to prevent its spread. State boards of health have increased in number and in power. There are now thirty-seven, and at their recent conference in

New York City, the reports revealed not only their zeal and activity, but an increase in the legal power and pecuniary resources of many, brought about by their own efforts within the past year. In States that have no board of health, or for other reasons fail to execute such regulations as are necessary to prevent the spread of epidemic disease into adjoining States, the government, in the interest of all, under the act of Congress of February 15th, 1893, must undertake to enforce them.

QUARANTINE LAW AND REGULATION.

It will be germane to the subject and may be of particular interest at this time to give a *résumé* of the measures which have been taken by the National Government under the act referred to. This act, approved February 15th, 1893, is entitled "An Act granting additional quarantine powers and imposing additional duties upon the Marine Hospital Service." Stripped of its legal verbiage it provides, first, that no vessel shall enter a port of the United States from a foreign port without a bill of health, signed by the United States Consul, or a medical officer of the United States Government, and provides a penalty of $5000 to be imposed on any vessel coming into American waters without such bill of health. Furthermore, the vessel shall not be admitted to entry except in accordance with other provisions of the act, and with such regulations of State and municipal authorities as may be made consistently therewith; and before being permitted to enter or discharge its cargo or land its passengers a certificate must be obtained from the health officer at the quarantine station, certifying that the rules and regulations have in all respects been complied with, both on his part and on the part of said vessel and its master. This bill of health and the quarantine certificate are to be delivered to the collector of customs.

The Secretary of the Treasury is directed to make rules and regulations to be observed by vessels at ports of departure and on the voyage, and the President may detail a medical officer of the Government to serve in the office of the consul at any foreign port for the purpose of making the necessary inspection of vessels, to see that the regulations are complied with, to sign the bills of health, and to furnish information.

Consular officers are required to be notified by the Secretary of the Treasury of the regulations made with regard to vessels, cargoes, passengers, and crew at ports of departure and on the voyage ; and of the regulations also to be observed in the inspection and treatment of vessels on arrival at ports of destination in the United States. The Supervising Surgeon-General of the Marine Hospital Service is required to examine the quarantine regulations of all State and municipal boards of health, and at ports or places which are found to have no quarantine regulations under State or municipal authority, where such regulations are, in the opinion of the Secretary of the Treasury, necessary, and at ports or places where State or municipal regulations exist, which, in the opinion of the Secretary, are not efficient, the Secretary is empowered to make aditional rules which, after being promulgated, are to be enforced by the sanitary authorities of the States and municipalities if they will undertake to execute and enforce them, but if said authorities refuse or fail, the President shall adopt such measures as are necessary to their enforcement.

The law further specifies that it shall be the duty of the Supervising Surgeon-General of the Marine Hospital Service, under the direction of the Secretary of the Treasury, to perform all the duties in respect to quarantine and quarantine regulations which are provided for by this act.

It further provides that information shall be obtained of the sanitary condition of foreign ports and places through the consular officers of the United States ; that weekly reports shall be obtained of the sanitary conditions of ports and places within the United States, and for the collection of such other information affecting climatic and other conditions of the public health as may be pertinent. Weekly extracts of the consular and other sanitary reports are to be prepared and published, and transmitted to the collectors of customs, State and municipal health officers and other sanitarians. The law further permits the Secretary of the Treasury to remand an infected vessel from any port, which is not provided with proper facilities, to the nearest national or other quarantine station, and after treatment at a national quarantine station, with a certificate furnished by the United States quarantine officer, a vessel shall be admitted to entry at any port of the

United States named in the certificate. But at ports where sufficient quarantine provision has been made by State or local authorities, the Secretary of the Treasury may direct vessels bound to said ports to undergo quarantine at said State or local station.

An important section of this act is that which gives the President the right to prohibit in whole or in part the introduction of persons and property from such countries or places as he shall designate, and for such period of time as he may deem necessary, whenever by reason of existence of cholera or other infectious or contagious disea e in a foreign country there is serious danger of the introduction of the same into the United States, despite the quarantine defences.

Provision is also made that if a State wishes to surrender the use of its quarantine buildings and disinfecting apparatus to the United States, the Secretary of the Treasury is authorized to receive them and pay a reasonable compensation to the State for their use.

The first step under this new law was the framing of regulations for vessels at foreign ports. To assist in this duty a board of medical officers of the Marine Hospital Service was convened, and the regulations framed were approved by the Secretary of the Treasury February 24th, and duly promulgated. These regulations prescribe the form of the bill of health ; the definition of an infected port ; what vessels shall be inspected before the bill of health is granted ; the time and method of making the inspection, with all necessary details for the enforcement of cleanliness and perfect sanitation, including disinfection, and relating both to the vessel itself and the cargo, crew, and the passengers, both steerage and cabin. In ports infected with cholera, passengers of the cabin class must produce evidence as to abode during the four days immediately preceding embarkation, and if necessary they and their baggage may be detained and the baggage subjected to such disinfection as is necessary. Steerage passengers in a cholera-infected port, or from a cholera-infected place must be detained five days under medical observation, and their personal effects and baggage must be disinfected by steam. The regulations further forbid the shipment of certain articles of bedding and clothing from an infected port, also certain

articles of merchandise, such as old rags, old jute, and old gunny, during the prevalence of an epidemic and for thirty days after it has been officially declared at an end. All rags at all times are to be disinfected before shipment to the United States.

Under the law these regulations are to be enforced at foreign ports, either by United States consuls, or by medical officers of the United States Government, when said medical officers have been detailed by the President for that purpose.

An examination of the records shows that the chief ports of embarkation of the immigrants most liable to bring contagion are as follows :

Southampton, Liverpool, Hamburg, Bremen, Rotterdam, Amsterdam, Antwerp, Havre, Marseilles, Genoa, and Naples. Accordingly a medical officer of the Marine Hospital Service has been detailed by the President to serve in the office of the consul at each of the ports named. These officers have all had experience with ships, and with but two exceptions have had actual quarantine experience. They have been at their respective stations now for a period of two months, and their reports show both the necessity of their presence and the good results of their activity. This is a new departure in quarantine—quarantining in foreign lands—and the ultimate result may be looked for with great interest. Whatever the result may be, certain it is that the presence of these officers in European ports has diminished in a great degree the danger of introduction of cholera and other diseases from those ports. Their relations in one or two instances with the foreign governments were in danger of being strained, but this danger has been averted both by their tact and good judgment, and because of the all-powerful United States law, which practically says to foreign officials that should they object to the official acts of these officers, the alternative is the refusal of the bill of health and the cutting off of all commerce between their ports and the United States.

For securing uniformity of action among these medical officers, and that the bureau may be informed as to any special difficulties in enforcing the regulations, an inspecting medical officer is now under detail, visiting each of these ports for the purpose named.

To aid these medical officers and the consuls in the performance of their duty a letter of instruction has been issued by the State Department, addressed particularly to United States consuls at interior places in Europe and Asia, directing that when merchandise or immigrants are about to leave or have left any section within their respective consulates where cholera prevails, they shall notify by telegraph the United States Consul or medical officer at the seaport selected for embarkation, that the officer may be prepared to enforce the detention and disinfection required.

On May 4th a circular was issued to consuls and medical officers, requiring all baggage of immigrants coming from any port to the United States to bear a label certifying to either inspection or disinfection. Furthermore, each immigrant is to be furnished with an inspection card giving his name, last residence, name of ship, port and date of departure, and a reference number relating to the manifest which is required by the immigration regulations, and in which is contained much information regarding each immigrant. This card is to bear the stamp of the consulate. It is also to be stamped or punched at the quarantine at the port of arrival, and again at the immigration depot, and it is to be held by the immigrant until he reaches his point of destination. These inspection tickets, and the labels upon the baggage will furnish to the health officers of the interior States information which they have much desired with regard to immigrants coming within their borders. These provisions also insure care and accuracy on the part of medical officers, and particularly on the part of United States consuls at ports where immigrants do not usually embark for the United States, but which may be sought by them in the hope of avoiding the enforcement of the stringent rules at ports where medical officers have been stationed.

For the vessel on the voyage certain rules have been promulgated relating to inspection and sanitation, isolation of the sick, and requiring a clinical history by the ship surgeon of all cases of sickness to be delivered to the quarantine officer at the port of arrival.

Having thus detailed the precautionary measures set in operation abroad, I will now narrate briefly those which have been taken on this side of the Atlantic.

First, I may refer to the danger which, for some time, seemed to be imminent by reason of immigration through Canada. The Canadian laws do not provide for the inspection and sanitation of ships and passengers at foreign ports, and it was feared on this account there would be a large deflection of immigration to Canada. But owing to the public-spirited policy of the Canadian Government, and the energy and efficiency of the chief quarantine officer, Dr. Montezambert, the danger of introduction of cholera through Canada has been reduced to the lowest possible degree short of prohibition of immigration. All immigration into Canada is now *via* the St. Lawrence River. Forty miles below Quebec is stationed the Grosse Isle quarantine station, with perfect apparatus for scientific disinfection and accommodations for the sick and suspects. This station is reserved for infected vessels. Further up the river, at Quebec, is the Louise Embankment, where is located a complete disinfecting plant; while at Point Levis, directly opposite, is located another. All immigrants, whether from infected or non-infected countries and though coming on non-infected vessels, are obliged to undergo inspection at one of these two points, and all their baggage is disinfected by steam, the containers being washed with a solution of mercury. The disinfection is not one in name, but is thorough and complete. The Canadian Government has very courteously assented to allow representatives of the Marine Hospital Service, two in number, to be stationed at Quebec for the purpose of inspecting the disinfection and labelling the baggage and giving certificates to immigrants bound for the United States.

It was feared at one time that Halifax would be a point of danger during the present season. Halifax is the winter port of entry for Canada, and it was proposed to continue the landing of immigrants there through the summer, but the steamship agents were informed that the quarantine plant at Halifax is insufficient; and therefore immigrants arriving there and seeking entrance into the United States through Canada would be subjected at the border to every possible delay through inspection and disinfection by the United States officers, or perhaps be turned back into Canada. Assurances

were thereupon given that no immigrants will be carried to Halifax.

Thus it would seem that protection against the introduction of cholera through Canada is as complete as it can be made.

With regard to the quarantine and maritime ports in the United States, it will be remembered that the new law provided that an examination should be made of all State and local regulations, and if any were found insufficient, the Secretary of the Treasury should make additional ones. In accordance with this provision a request was sent to all quarantine authorities to transmit their rules and regulations to the Marine Hospital Bureau. A general response followed, and after examination it was evident that to determine upon the sufficiency of all, a minimum standard must be established embodying what should be required of every quarantine station in the United States.

A uniform quarantine code for the maritime ports of the United States has long been the desire of quarantine and sanitary officers, and heretofore all attempts have been futile.

A board of officers of the Marine Hospital Service was summoned to prepare a code. After the rules and regulations had been prepared and before adjournment of the board, a conference was called of the quarantine officers of the Atlantic and Gulf coasts representing the cities and ports of Portland, Boston, Providence, New Haven, New York, New Jersey, Philadelphia, Wilmington, Del., Baltimore, Norfolk, Wilmington, N. C., Charleston, Savannah, Florida, Mobile, New Orleans, and Texas.

This conference was called to order March 16th, and remained in session two days, the first day being devoted to a consideration of the rules which had been prepared, and discussion thereof, with the understanding that there would be no vote. The second day the rules were again read *seriatim*, discussed and voted upon. After adjournment of the conference, the board continued its labors, paying special attention to the views expressed in the conference. The rules thus perfected were then promulgated by the Secretary of the Treasury, April 4th, and a letter enclosing them was sent to each maritime quarantine officer, calling attention to the law and to the fact that these were minimum requirements and

requesting an expression of willingness and ability to execute them. Satisfactory responses have been received from all ports. These regulations relate first to inspection of vessels, stating what vessels shall be inspected, the time of inspection, and the method of making it. They define the quarantinable diseases, and declare under what circumstances vessels shall be placed in quarantine. They relate also to the treatment in quarantine, particularly of vessels infected with cholera and yellow-fever, and the time of detention and care of the passengers arriving on such vessels. Special regulations exist with regard to rags ; also with regard to vessels *suspected* only of being infected with yellow-fever.

As a further protective measure with reference to cholera, it may be stated that on the appearance of this disease in any maritime port, a system of immigrant-train inspection will be at once set in operation, medical inspectors to accompany each train from that port into the interior and provision made for the removal and care of the sick *en route*.

FOREIGN.

But while we have thus erected our sanitary fortification upon the coasts and have provided the means for *internal* warfare against epidemic disease, our duty is not yet accomplished. The danger of the attack should be eliminated. The sense of the American people should be aroused to an indignant protest against the approach of these diseases from other lands. Not one of them is indigenous. Cholera comes from India and Arabia, yellow-fever from Havana and other ports of Cuba, and from Central and South America ; typhus-fever comes from Russia and occasionally from Germany. It is time that a vigorous protest should be made to the governments of the countries where these diseases flourish. Every nation should be held responsible for any conditions within its border or within its dependencies which tend to propagate epidemic disease that may be carried to other nations with which it expects to maintain a friendly commerce.

Is it too much to expect that the *fons et origo* of cholera in India shall be eliminated ? But before discussing cholera in its home, consider a moment one of the chief means by which it finds egress therefrom. I refer to the religious pilgrimages.

In Mesopotamia are four Shiah shrines, the most sacred, Karbala, being the place of pilgrimage for large numbers of Shiahs from both India and Persia. Thousands of bodies from India and Persia and other countries where the Shiah faith exists are brought here by the pilgrims for interment. The place is one vast burial-ground, and cholera raging is carried back to their respective countries by the pilgrims.

In Mesopotamia also is the holy city of Islam, where the Mohammedan sect known as the Chitty send their dead for burial. In 1889 cholera was imported there from Bombay in the clothing surrounding the dead sent from Bombay for interment. Besides Karbala and Islam in Mesopotamia, Hurdwar in India, and Mecca and Medina in Arabia, are great foci for the development of epidemics which diverge therefrom in every direction.

In 1890 there arrived by the sea at Jedda and Yembo, the seaports of Mecca and Medina in the Red Sea, 43,000 pilgrims, of whom 28,000 only returned ; the balance representing the victims of cholera.

Why should the whole civilized world be allowed to suffer through the constant dread of invasion, or invasion itself of cholera, on account of the religious fanaticism of the Mohammedans of the East ? Why should the civilized nations of the world continue to look complacently upon these pilgrimages to Mecca with their horrible accompaniments of constant disease and death ? Death while *en route* to the shrine at Mecca is welcomed by all true followers of the prophet as a certain passport to eternal bliss ! So long as this religious theory affects themselves alone, it might be viewed with complaisance, but when it involves the health and the lives of thousands of others to whom such a thought is a very absurdity, it is the right as well as the duty of those others to protest. This subject has no longer a far-away aspect. Steam has brought us into closer connection with Mohammedanism. All nations are incomparably nearer to one another than twenty-five years ago, and the welfare of the most distant places on the face of the earth has now a direct bearing upon our own health and lives. The Mohammedan pilgrimages are a subject for international arbitrament.

What pressure can be brought to bear upon the Turkish or

other government, to strip these pilgrimages of their disease-bearing features, is a subject for immediate consideration, but one that will require careful study on the part of those versed in diplomatic relations. But when it is remembered that the vessels which carry these pilgrims, and upon which this disease breaks out, are owned by other nations, it would seem entirely practicable to establish restrictive measures. I know that some of England's vessels carry these pilgrims, as well as vessels of other nations. Are not these vessels, therefore, and the governments under whose flags they sail responsible in great part for the spread of this horrible plague?

Again, with regard to the harbors of the West Indies and South America, yearly menacing our coast—should not some pressure be brought on their governments to place them in sanitary condition? Ask of the men who, year by year, stand upon the quarantine piers of our Southern cities and greet the vessels as they come from these infected ports, who remove to hospital the crew or passengers stricken with yellow-fever, who clean and disinfect the ships, and whose minds, in addition to the bodily activity required, are strained from May until November lest through some chance oversight of their own the terrible contagion of yellow-fever may pass their outport and strike the coast of the United States. Despite the exemption of the last few years yellow-fever is the prevailing thought throughout the South during this period. The quarantine officers, the physicians, the commercial men, and the daily press are on the *qui vive*, watchful, anxious. Why? Because, forsooth, our neighbors are content to live with an indifference to sanitation, life, and health unknown within our borders.

In connection with the extermination of the source of epidemic disease should be mentioned the recent brochure of Dr. J. Telyafus, of Tiflis, Russia, who has expressed his views upon the means of strangling cholera in its Indian home and thus freeing Europe and America from the constant menace of its periodical excursions. I quote from a recent review:

"Dr. Telyafus takes this exception to the opinion that any attempt to exterminate the germs of cholera in India is utopian. He states that it has been stamped out in the Nile delta, and that similar or more energetic measures would be

equally effectual on the banks of the Ganges. Formerly the fellaheen of Egypt interred their dead on the banks of the river Nile, and the bodies were then washed out into the stream during the annual overflow of the river, and were carried down to spread disease throughout the delta. Since an end has been put to this custom, the plague no longer harasses the country. While it would be difficult, if not impossible, to restrain the natives of India from casting their dead into the waters of the sacred Ganges, it might be possible to compel them to cremate their dead and throw the ashes, if they will, on the border of the river. Drainage and the planting of the eucalyptus-tree, while an enormous undertaking, is one, in the opinion of Dr. Telyafus, not impossible, similar work having been already accomplished with profitable results in Algiers."

THE EFFECT OF IMMIGRATION ON THE PUBLIC HEALTH.

A most important subject for consideration at the present time is the effect of immigration on the public health. So far as *epidemic disease* is concerned, it is superfluous to call attention to the menace thereof accompanying immigration; and the measures taken to meet this danger, and the one held in reserve, prohibition, have already been described.

Concerning the other contagious diseases, not ordinarily epidemic, there is no doubt also of the increased liability thereto in the United States from this same cause.

Recently a cablegram was received from the medical officer detailed at Naples that nine ships would leave within ten days, carrying 11,000 immigrants. They are arriving at New York now at the rate of 15,000 a week—each week a new city's population grafted on the nation!

This wonderful movement of the earth's inhabitants during this latter part of the nineteenth century presents many phenomena of striking interest to the sociologist, and many problems to the sanitarian.

Where do they come from, why do they come, and what is their ultimate condition? From the standpoint of the sanitary officer it is difficult at this time to see aught but danger in this movement, or to have any other wish than that it might be stopped.

But if we may rise above our present fears and consider the subject from a very broad standpoint which commands an international as well as a national or local view, we may see in this movement a blessing to humanity, not only political and intellectual, but physical as well.

Pressed out from their narrow confines, these people in swift moving columns and in swift moving ships are landed on our coast; they separate, and are almost lost to view in our vast expanse of territory.

Forced out of overpopulated districts either by a Russian decree or by their own appreciation of their unfortunate surroundings, they seek the United States as a land of promise, and in their broader surroundings and breathing the political life of a government of the people by the people, a broader and more intelligent manhood *must* be theirs.

First impressions are lasting, and the opportunity therefore is great to impress upon this large and constant addition to our citizenship a profound regard for the laws of public health in their new homes.

At the foreign port of departure the immigrant to-day receives his first sanitary impression of the new world as he presents himself for scrutiny by the medical officer of the United States Government before being permitted to board his ship.

Again must he pass a quarantine officer at the port of arrival, and once more at the immigration station be closely and individually scanned or catechised by the medical inspector.

How can he fail to be impressed, to some degree at least, with the importance attached to health in the United States?

On arriving at his destination in the State chosen for his permanent home, he is the better prepared to accept such restraint or obligations of a sanitary nature as may be imposed by a local or State board of health.

There is opportunity, therefore, for each board of health to build up within the borders of the State a tolerance and respect for sanitary laws.

Nor is the effect upon the overpopulated districts in Europe to be lost sight of. Surely the relief in some communities must be obvious.

Moreover, statistics prove that thousands of immigrants revisit their homes. The sanitary teachings of the new world go with them and cannot be without effect.

We cannot forget, however, that while the physical condition of the immigrant is improved, and the sanitary condition of the locality he has left, the same cannot be said of our own domain and people, and greater stringency both in the laws and their execution is demanded.

THE NON-EPIDEMIC CONTAGIOUS DISEASES.

Of the contagious diseases not ordinarily epidemic in character, but which are actually the more destructive to human life (as diphtheria, scarlet-fever, typhoid-fever, measles, and tuberculosis), it may be said that with the exception of one (tuberculosis), the means of preventing their spread is so plain that it is within the power of every community to accomplish it.

While therapeusis is an indispensable antagonist to these diseases, their subjugation will be accomplished only by a triple alliance of *law*, *organization*, and *disinfection*. Gradually the laws are spreading throughout the United States and municipalities, requiring notification, placards, disinfection, and construction of special hospitals. Within a year even the White House has been placarded for scarlet-fever, furnishing notable illustration of cheerful compliance with the law which may well be considered by those who would oppose it.

Sanitary plumbing and architecture, purity of water supply, proper disposal of sewage and garbage, all are prominent subjects of town and municipal concern, and any community found indifferent thereto should be held up to public condemnation.

All sanitary organizations should be modelled after our national and State governments, embracing the three heads—legislative, executive, and judicial. The framing of laws requires a skill and training apart from that required for their execution, and they accomplish their object more effectively when executed by others than those who make them, and back of them a wise judiciary preserves a just balance between the individual and the public.

Valuable adjuvants from time to time in municipal sanita-

ion are the voluntary organizations called into existence by some particular threatening danger or by official laxity.

The most recent organization of this nature, formed because of the possible advent of cholera, and one which may be taken as an excellent model, is the Sanitary League of Washington, a full description of which will be found in the abstract of sanitary reports of this date.

DISINFECTION.

But with regard to the destruction of these domestic contagious diseases the key-note of success appears to be disinfection, and while the germicidal properties of the several disinfectants are known, still much depends upon their mechanical application—upon the mechanical devices for their distribution.

As stated by Dr. Cyrus Edson, Health Commissioner of New York, whose experience in municipal and house sanitation is probably unsurpassed, the great difficulty in practical disinfection is in eliminating the personal equation—that is, on account of the carelessness or ignorance of individuals to whom are intrusted the actual work, their failure to comprehend its principles and to care for details, it is often inefficient.

Now this personal equation may be eliminated provided a mechanical device is found by means of which there shall be obtained a diffusion and penetration of the disinfecting gas equal to that of the germs of the disease.

Recently attention has been called to two new *forms* of disinfectants, which with especial mechanical devices promise to be among the most potent instruments in our sanitary armamentarium.

The first of these is a recent discovery produced by the action of an electric current, electrolyzing sea water.

Doubtless all the details concerning this agent will be published by its inventor in New York, but at present I can only say that the resultant solution contains germicidal and deodorizing properties of a remarkably high degree, while the cost is immeasurably lower than that of any known disinfectant permitting the application.

The second disinfectant is the anhydrous liquid sulphur dioxide. True, this has been known for several years, and experiments demonstrating its utility were made in the laboratory of the Marine Hospital at New York five years ago.

But no device for its practical use has been offered till within a month, and it is but recently that placing it in the market for sanitary purposes has been seriously considered.

This liquid dioxide, confined in copper carboys of from fifteen to two hundred pounds weight, may be easily transported, and simply by liberation will throw off the sulphurous acid gas, filling either a small room or the hold of a vessel with any required per cent.

A simple apparatus for carrying the gas cylinder from place to place, which at the same time can be used for weighing the gas liberated, has been recently devised by Passed Assistant Surgeon Kinyoun, and may be seen in the Marine Hospital exhibit in the Government building at the Columbian Exposition.

The present difficulty with regard to this disinfectant is that its manufacture is a secret process, and the first cost of a plant large enough to supply the demand would be great. But it has been suggested that the general government might appropriately meet these two difficulties, and in doing so would confer a great benefit upon the country, for it could then furnish to local health authorities any amount of the agent in question, and at a cost that would permit its free use.

The object of the present paper will have been accomplished if it but serves to awaken interest in the possibilities suggested by its title.

Says Dr. D. B. St. John Roosa, in the May number of the magazine: "Many of the illnesses that are thought to be special dispensations from Providence occur only because of the neglect of personal care.

"The time will probably come, however, when the human race will everywhere, with only exceptional instances, live out its life. It is perfectly possible to conceive of the domination of human intellect and human force being so universal as to abolish accidental deaths."

The day of this deliverance seems yet far off. We may not even claim to see the morning's rosy hue, but surely we *may* discern its first gray dawn and rouse to effort. The struggle is worthy of man's greatest powers, and even while striving we shall add great motive power to the upward progress of man toward his final destiny, whatever that destiny may be.—*The Journal, July 1st and 8th,* 1893.

CONTRIBUTIONS TO THE BACTERIOLOGICAL STUDY OF THE DRINKING WATERS OF THE CITY OF MEXICO.*

By José Ramirez, M.D., Secretary of the Supreme Board of Health, Professor of Botany in the National Medical Institute, and Manuel Toussaint, M.D., Professor of Physiology in the National Medical Institute.

The City of Mexico consumes drinking water: First, from the springs of Chapultepec; second, from the springs of Santa Fé, Los Leones y el Desierto; third, from the river Tlalnepantla or water of the town of Guadalupe; and fourth, from artesian wells.

SPRINGS.

Spring of Chapultepec.—This water, which is known under the name of HARD WATER (*agua gorda*), is the first which was brought into the city, and eighty years before the Conquest a special aqueduct existed for that purpose. In March, 1779, the arches and aqueduct were finally concluded, including 904 arches with a total length of 4663 varas. The spring is situated within the forest of Chapultepec, and to the eastward of the hill it has a retaining wall of masonry which was constructed before the year 1571. With the lapse of time the level of the water has lowered considerably, and especially since artesian wells have been introduced in the neighborhood of Chapultepec. The qualities of this water are as follows: a blue color, a remarkable transparency that allows the bottom of the spring to be seen, an agreeable taste, and an average temperature of 21°. The vegetation is formed of algæ of an indetermined class.

The spring abounds in small fish and crustaceæ.

This water is in the best condition to be considered as a type of drinking water, as, on account of the piping laid down before the end of last year, the water no longer runs through the old aqueduct, which was open along its entire length, and we now can say that it is free from all danger of the contami-

* Read at Meeting of the American Public Health Association, Mexico, November 28th, 1892.

nation that it was liable to before that date. Doubtless it was for this reason that Sahagun, in speaking of these waters, said that they were "bad and insufficient for the supply of the city." In fact, these waters have always run in an open conduit, receiving impurities which the wind carried from the causeways along which they ran, and forming small pools with the water which leaked from the cracks in the arches.

Spring of Alberca Grande.—The City Council having acquired the property in this spring and prepared plans for conducting the water into the city, it will be utilized from this year. The water is elevated by means of powerful steam pumps to a tank situated on the side of the hill of Chapultepec, to which tank will also be elevated the waters of the spring within the forest, so as to bring them altogether in the city under high pressure. The properties of these waters are the same as those of the spring above spoken of. They rise outside of the forest and are contained in a rectangular tank measuring 17 by 13 metres, with a depth of 12 to 15. Several animals and plants live in this tank, and among the latter we have observed an abundance of *Ceratophyllum demersum* (Linn).

Spring of Santa Fé.—In the year 1576 the supply of water from the spring of Chapultepec was found to be insufficient for the requirements of the city, and the Viceroy D. Martin Enriquez granted to the city the water rising in the spring of Santa Fé. In the following century (1603–20) the government commenced and terminated the construction of the aqueduct which, commencing above Chapultepec, followed the causeway of La Veronica and terminated in the Mariscala Street. This work cost $150,000, had a length of four miles, and was formed of more than 900 masonry arches. History has given us the dates of the establishment of the partial piping of this water, and now that the iron piping has been laid as far as the Molino del Rey, the City Council gave orders that the soft water should be brought through that into the city after the month of September, establishing at the same time a connection between this and the tank dedicated to the reception of the hard water, so that in case the quantity of either should be diminished for any reason the supply to the city would not in any way suffer.

The spring of Santa Fé is situated near the village of the same name, in the midst of a small forest of pines, willows, and poplars. The water has a temperature of 14°, and the spring is situated at a distance of 9716 metres from the city and 166 metres above it. Several kinds of plants and small animals live in the water.

The waters of Santa Fé are incorporated with those of Desierto and of Los Leones before arriving to the place known as Casa Mata.

Springs of El Desierto and Los Leones.—Two centuries had elapsed and the increase of population and necessities in the city obliged the authorities to look for means of increasing the amount of water, the consequence being that they found themselves obliged to utilize the springs of Los Leones and El Desierto. This improvement was carried out in the year 1796. The waters from these springs, together with those from Santa Fé, form the volume of what is known under the name of *soft water* (*agua delgada*), and from them is drawn the supply for two thirds of the population. These springs rise on the two slopes of the mountain called San Miguel. They are very numerous, but only produce a small quantity of water each. They have not as yet been properly fenced, and they rise in the midst of small swamps, a fact which is undoubtedly unfavorable to their purity. As far as the tank of Los Leones, the waters from the spring of that name flow in open gutters on the side of the ravine, and from there they follow their course in a masonry gutter which terminates in a wooden one, the latter carrying them to the aqueduct in which flow the waters of El Desierto. These springs rise on the eastern side of the same mountain of San Miguel, and are more abundant than the previous ones. The waters flow in open gutters similar to the last, but at a lower elevation, and they receive in their course the waters from the springs of Champilato and Monarca, Los Capulines, etc., eventually uniting with those from Los Leones before arriving at a point called Tres Cruces. From that point the waters flow in conduits lined with brick, but open in many places. The direction of the aqueduct is to the eastward. It reaches Molino Viejo and from thence proceeds to the settling tank of Tinacal, Molino del Rey, and terminates in the arched aqueduct that conducts

the water to the city. Later on we will speak of the modifications that have been made within the present year, by bringing the waters from the Molino del Rey through a new iron piping, instead of bringing it by the old aqueduct on the Veronica road, thus diminishing to a considerable extent the risk of contamination in these waters.

The height of these springs over the level of the city is 900 metres more or less.

This water has a temperature in the springs of 9° to 11°. They are slightly alkaline, transparent in the absence of rain, when they are mixed with ochrous clay which enters largely into the formation of the ground in which they rise. The places in which these springs rise have the vegetation which is natural to mountains.

Water of the town of Guadalupe. This water comes from the neighborhood of the Tlalnepantla Hills and flows through an aqueduct three leagues long, the construction of which was commenced in 1743 and terminated in 1751. This aqueduct supplies the villages of Santa Isabel, Zacatengo, Tucamá, and the town of Guadalupe. It now also supplies a small part of the city, through iron piping which was laid along the causeway in 1882, from that town, and supplies water to those blocks situated between the Calle of Santa Ana and the Avenida de la Paz. From its chemical character this can be classed as soft water, but unfortunately it is highly charged with sediment which it receives on the slopes of the hills.

Artesian wells. According to the data collected by the government of the district there were 483 artesian wells in the city in April, 1883. As a general rule, the waters from these wells are characterized by a perfect transparency, by the absence of organic matters when the wells reach a good depth and are well lined, and by a smell *sui generis*, due to the carbonic gas which is readily dissipated on exposure to the atmosphere.

BACTERIOLOGICAL ANALYSIS OF THE WATERS OF CHAPULTEPEC.

During the months of June, July, and the beginning of August—that is to say, when these waters flowed through an open aqueduct—we undertook an examination of the same,

taking it from the fountain in the Medical Institute. Before continuing, and in order to avoid further digression, we must observe that in all these analyses we have strictly followed the methods employed in the laboratories of Europe for the same purpose, utilizing the experience which we acquired in the Pasteur Institute when we followed the course of bacteriology which was given by M. Roux during the months of March and April, 1890. We have also taken advantage of the resources at the disposal of the National Medical Institute, which can almost be considered as amply sufficient for researches of this class.

The water, which was collected with all the necessary precautions, was placed in Petri boxes with gelatine and agar, and these boxes were placed in a room having a maximum temperature of 23°. After many analysis we found that on an average each cubic centimetre of water contained from 1000 to 1200 bacteria—that is to say, that, according to Miquel's list, the water from the Chapultepec spring ought to be considered as within the inferior limits of pure waters. It is to be noted that the number of micro-organisms varies from day to day, and that we have as yet to determine the circumstances which cause this variation. Thus we find very frequently that on preparing ten Petri cases, all at the same time and with water from the same flask, six or eight will remain without producing any colony, while on the following day and with an exactly similar preparation all the cases will be found to have fertilized, and some of them to have colonies so numerous as to be beyond counting.

The species that we have been able to isolate up to the present are twelve, and their characteristics are those set down in the following enumeration. We have taken their denominations from the aspect which they present in the colony developed in gelatine or in agar, as we do not care to give them their specific names until we are fully convinced that they are bacteria which have not been described by other authors, as we believe the greater part of them have been.

1. Orange-colored colony, which liquefies gelatine. Long bacillus with a slow movement, difficult to color. Grows rapidly in gelatine, which it melts, and is deposited at the bottom with a metallic appearance. In agar it develops

slowly, and the coloring matter is diffused throughout the mass. In broth it has fair development, smells like glue, clouds the broth, and is deposited at the bottom. In potatoes it has a very slow development and preserves its color.

2. Solid orange-colored colony. Very small micrococcus. In gelatine it has slow development and liquefies it when inserted with a needle and delays in taking on color. In agar, with a similar cultivation, it grows at a depth, taking a gray color. In broth it has a very slow development, gives forth a bad odor and renders it turbid. In potatoes it will hardly develop.

3. Rose-colored colony. Very small micrococcus, without movement. In gelatine it grows slowly, takes on a gray color at a depth, and does not liquefy it. In agar it has similar characteristics, forming a rounded colony which projects. In broth it has a medium development, is deposited at the bottom, and does not give out any bad odor. In potatoes it hardly develops.

4. Solid green colony. Micrococcus without movement. It slowly liquefies gelatine, forming a deposit with a whitish color. In agar it does not liquefy, takes on a greenish-yellow color, does not develop at the bottom, and gives forth a bad odor. In broth it causes a turbid appearance, has a dirty looking reddish-yellow deposit that finally takes on a rose color ; it has an easy development, taking on its own color.

5. Green colony, which rapidly liquefies gelatine. A short bacillus having movement. It liquefies gelatine, communicating to it a bluish-green fluorescent color. In agar it has a rapid development, does not liquefy, the coloring matter is diffused throughout the mass, forms a projecting rounded colony, and has a yellow sulphur color. In broth it develops rapidly, renders it turbid, makes an abundant deposit, communicates its own color, and has a putrid odor. In potatoes it has a fair development with a red brick color.

6. White colony in clots : Estreptococcus. It slowly dissolves gelatine, taking a dirty yellow color in old cultivations. In agar it develops, forming clots. When sown in stripes we find small rounded colonies appearing on the side of this and at a certain distance ; it does not liquefy the agar and takes on the same color as the gelatine in old cultivations. In

broth it renders it turbid, communicating to it a green color, and forming a whitish deposit at the bottom. In potatoes it has an easy development characteristic of itself, and forms white masses which turn to powder on the surface.

7. White colony that rapidly liquefies gelatine. A micrococcus with a rapid vibratory movement. It liquefies gelatine, as already stated. In agar, when inserted with a needle, it extends along the perforation made and on the surface, with a dirty white color which is communicated to the entire medium. In broth it communicates a color similar to that of urine, renders it turbid, forms a scarce whitish deposit, and gives forth a bad odor. In potatoes it has a characteristic and rapid development, forms damp, abundant, and projecting masses, which produce gas bubbles, raising them in certain points to the surface. These masses after a few days take on a reddish color which changes to black, and give forth a smell of sour paste.

8. White colony. Cladotrix, with very thin ramifications. In gelatine it has a very slow development, forms a tissue on the surface with white clots, dry and projecting. In potatoes it does not develop, as far as our knowledge goes.

9. Ramified white colony. Ærobius and anærobius bacillus. In gelatine it liquefies with a slow development. In agar it has a rapid development, with a dirty, milk-white color. It sends forth ramifications which afterward form projecting folds. Sown in stripes it forms a damp, milk-white colony, with small isolated colonies on the sides. In a Petri case it extends along the bottom, throwing out ramifications. In broth it has a rapid growth, renders it turbid, and forms a white deposit in the bottom. In potatoes it extends rapidly, forming a thick layer, which is at first damp and of a dirty white color, but afterward dries and wrinkles, forming projecting folds.

10. White dry colony. A micrococcus. In gelatine it forms a milk-white colony, appearing like a drop of that liquid. It liquefies slightly. In agar, when sown in stripes, it forms a colony with a color similar to the ramified colony, but without throwing out ramifications; inserted with a needle it extends superficially, with the appearance of a drop of milk or glazed porcelain. It does not render broth turbid,

but forms a deposit at the bottom. In potatoes it forms a white mass, which develops with a certain facility, and is distinguished from the estreptòcoccus by the color which the latter takes in old cultivation.

11. White transparent colony that liquefies in a funnel shape. A long bacillus. In gelatine it liquefies as stated. In agar it takes on a slightly dirty white color, it develops at the bottom, and when the cultivation is old it takes a dirty yellow color. In broth it develops abundantly, gives it a muddy appearance, forming a dirty white tissue on the surface and gives forth a bad smell. In potatoes it has a rapid development, forming a thick, damp, orange-colored layer, that in old cultivations takes on in certain points a still dirtier color.

12. White colony, developed in broth at 45° : Micrococcus. In gelatine it develops on the surface with a white color. In agar it has a rapid development, similar to the preceding. It gives broth a muddy appearance. It does not develop in potato. Besides these bacteria we have obtained two others whose character we have not been able to study in their different mediums, and we can only observe that one of them is anærobia and the other ærobia, the first being a micrococcus and the second a bacillus in the form of comma.

In the months of October and November, when the water was already flowing through the iron pipes, we renewed our cultivations, and the result, as may be easily supposed, was a discovery of a very diminished number of bacteria contained in a cubic centimetre of water. The average that we then obtained was from 400 to 500. This decided diminution is due to two circumstances : first, that the water flows through closed pipes and can only be contaminated in the spring or in the tank ; and, second, that the present temperature is lower than at the time of our first experiment. Next year, when we repeat our experiments under the same conditions with respect to temperature, we will know what share of this diminution belongs to each of these factors. With respect to the frequency with which the species obtained has appeared in this new series of cultivations, we can note that there has been a considerable diminution in that which produces orange-colored colonies that liquefy the gelatine, the green colony

that produces the same phenomenon, and the cladotrix, and that in exchange we more frequently meet the white colony which liquefies gelatine in the shape of a funnel.

In concluding this part relative to the bacteriological studies, we can state that from the cultivations that we have made of the atmospheric organisms, we have come to the conclusion that the greater part of those contained in the water proceed from the air. In fact, we only require to expose a Petri case with sterilized gelatine to contact with the atmosphere for one or two minutes to obtain colonies which are identical with those produced by cultivation from water.

Soft water. The experiments on this water were carried out in the months of October and November, drawing it from the fountain in a house situated in the Rinconada de San Diego. We found an average of 750 bacteria per cubic centimetre of water, and it was probably on account of the low temperature of those days that we found the colonies predominating to be numbers 2, 3, 5, and 7 of those which were enumerated in treating of the hard water.

As we have before said, these studies are as yet very incomplete, but we propose to continue them through the year 1893. For this purpose we will take water from the springs themselves and from different parts of the aqueducts, so as to be able to calculate the quantity of bacteria which they collected in their course ; besides this, we have the intention of completing the experiments by a bacteriological study of the air.

In undertaking the present study our intention was, once we had isolated these bacteria, to inoculate animals with their cultivations so as to determine their pathogenic action ; but circumstances to which it is needless to refer prevented our carrying out these experiments, and the small number of observations which we were able to make do not justify us in coming to any conclusion. The point that we desired to determine was to prove by actual experiments the theory that has been formed by several physicians, who suppose that the drinking waters of the city are the cause of the diseases of the digestive tube which every year carry off so many victims in this capital. It cannot be doubted that the above theory can only be proved or disproved by data discovered

through careful experiments. Nevertheless, with the advances which have been made in bacteriological studies of water, and by the results obtained in the numerous examinations made in other countries on the same subject, we can form a few conclusions which go a long way toward diminishing the probability for the theory under discussion. Indeed, the symptoms which up to this date have been attributed to the influence of bacteria proper to drinking water are not those which we observe in simple, acute, or chronic inflammation of the digestive tube. It is certain that many authors attribute sporadic cholera to micro-organisms which are developed and live in water, but it is also admitted that the cause of the disease is due to bacteria which normally live in the intestines. But we will put this question aside ; in the first place, because at this moment it is of no importance to ourselves, seeing that the cholera nostras is not more frequent here than in other parts ; and, in the second place, because this point is not as yet sufficiently cleared up, and its discussion would carry us out of the limits of the present paper. We do not deny the possibility of the transmission of certain diseases of the digestive tube by means of drinking water, but we only suppose it very improbable that the bacteria found in the entero-colitis, which are observed here, should be those which we have found in the waters drank in the city. Neither do we ignore that true dysentery is supposed to be produced by amœbæ, but we can only repeat that we have limited our present study to a search for the cause of simple inflammation of the digestive tube.

On the other hand, there are facts that may be called indirect which strengthen our assertion. We allude to the modifications which from time to time have been made in the distribution of the water, and which undoubtedly have improved its qualities. The iron piping was established in 1883–84, substituting the old lead piping, which by frequent deterioration permitted the contamination of the water with that from the drains, sewers, and subsoil. With this improvement all the causes of water pollution disappeared within the city, but by way of increasing the precautions the City Council in 1887 gave orders for covering a considerable length of the aqueduct at the place called Los Cedros and in other parts of its length.

After the carrying out of these improvements it would have been natural, if this theory were true, that the average deaths from diseases of the digestive tube should have suffered a proportionate diminution, but the statistics which accompany this paper show that the mortality has remained proportionally the same.*

These undeniable facts show that there is no probability in the theory that we dispute. On the other hand, we have many other reliable data which justify the ideas enunciated, and these data are so well known that there is no necessity for our publishing the figures, as it is enough to form the curve of the preceding statistics to be convinced that one of the principal causes of the mortality should be attributed to that complex group of meteorological circumstances which are known under the name of *seasonable causes*. And, in fact, observation has demonstrated that humidity, heat, and sudden changes of temperature are the conditions which favor the development of intestinal inflammations. In Mexico the temperature rises during the months of March, April, May, and June. During the last month the rainy season commences, and simultaneously with that rises the curve of mortality through the diseases we are treating of. In November, December, and January the temperature lowers, the hygrometric condition is at its lowest, and the curve of mortality lowers considerably in January, February, and March. To these different causes we ought to add another of the greatest interest: the insufficient food which is taken by the poorer class and even by the majority of the middle class. The abuse of tortillas, chile, and pulque, as well as of the half-ripe fruits, and the insufficiency of food containing azote, are facts perfectly well known to everybody, and which also explain the weak constitution which we find general among the inhabitants of the city. In conclusion we may say:

* Statistics referred to show that the total mortality and the mortality from gastritis, gastro-enteritis, entero colitis, cholera infantum, and sporadic cholera, compiled from data in the archives of the Statistical Department of the Supreme Board of Health, in the City of Mexico, for the ten years 1878 to 1887 inclusive, was, respectively, 95 271 and 23 759—ratio of deaths from intestinal diseases to total from all causes, 1 in 4. For the four years, 1888 to 1891, the numbers were, respectively, 60 483 and 11 586—1 in 5 21.

For the year 1891 exclusively, the numbers and ratio were, respectively, 2837, 1219 – 2 33.

1. That the causes are various which determine and favor the acute or chronic inflammations of the digestive tube, and which produce a considerable mortality in Mexico City.

2. That among these causes we ought to consider as principal ones the inadequate alimentation and the special climatological conditions of the locality.

NOTE.—This paper, as presented, was accompanied by a map showing the springs and aqueducts referred to.—EDITOR.

"PEACH FEVER," AN OCCUPATIONAL DISEASE, not infrequently seen among the employés in the fruit-packing and canning establishments of Maryland and Delaware, is the subject of a paper by Dr. C. L. Anderson, of Hagerstown, Md., in a recent number of the *Maryland Medical Journal.* Dr. Anderson divides the cases into two varieties: First, the psychotic variety, marked by mental exaltation, ideas of grandeur, seen in persons having a lively imaginative faculty; second, the true peach fever, caused by contact with the fruit in the course of its being picked and packed for market. This variety is defined as "a morbid condition of the respiratory and cutaneous surfaces, with some consequent systemic disturbances, due to irritation from the pubescence of the skin of the common peach—the *Amygdalus persica.*" The Schneiderian membrane first becomes irritated and tumefied, and yields a large flow of serum and mucus. The frontal sinuses, the conjunctivæ, and the larger bronchi may take on, by extension, the same kind of disturbance; cough and asthma may be excited in susceptible subjects. On the skin, the chief display of this amygdaline inflammation will be found about the wrists, forearms, neck, and forehead. It commonly begins and ends in a macular or papular eruption, but it may go on to a true dermatitis and to pustulation. The febrile rise may be as high as two degrees, which may be taken to indicate the amount of systemic discomfort induced by the respiratory and cutaneous irritation. Thin-skinned and neurotic young women suffer more and longer than the pachydermatous men and the older women. The more experienced workers seem to become proof against the irritant after some years in the business. There is no evidence to show that the disorder is contagious.

THE VITAL STATISTICS OF AN APACHE INDIAN COMMUNITY.

By W. C. Borden, M.D., Captain, Medical Department, United States Army.

THESE statistics are of a community of nearly pure-blooded Indians living in abnormal environment.

As accurate vital statistics of American Indians are rare, if not unknown, this, and the fact that they show the effect of changed environment upon a nomadic people, give these statistics their particular interest. The lack of other accurate statistics of Indian communities gives no normal averages for purposes of comparison, making it impossible to determine the exact amount of divergence from usual rates which changed environment has caused in this community.

The extent of the effect produced must, therefore, remain inferential; but that there has been a decided departure from the normal will be plainly seen from the statistics themselves. These statistics, which are for a period of five years, from July 1st, 1887, to June 20th, 1892, were compiled by the writer from the official records of the military post at Mount Vernon Barracks, Ala., while on duty there during the summer of 1892, and are those of the Apache Indians now kept there under military supervision and control. This Indian community numbers about four hundred, men, women, and children (see Table I.), and is composed of various Apache bands, among them being the noted Geronimo and his followers, of Arizona fame.

The Apaches have lived for generations in Arizona and the adjacent parts of Old and New Mexico, becoming thereby constitutionally adapted to the dry, rarefied air and clear, diathermic atmosphere of the elevated regions of the southwestern part of the United States.

They are essentially nomadic and warlike in habit, and deserving of their appellation "Ishmaelites of the West;" they

have not only been notoriously hostile to the whites, but to alien Indian tribes as well.

This hostility to and non-affiliation with aliens has kept these Indians remarkably free from an admixture of foreign blood ; so much so, that in this community of about four hundred, there are but five persons in whom white blood can be traced. In 1886, after numerous outbreaks and hostilities and their capture by United States troops, the Indians now forming this community were removed from Arizona and taken to Fort Marion and Fort Pickens, Fla. They remained there but a few months, and in April, 1887, they were removed to Mount Vernon Barracks, where they now are.

Their condition during their stay in Florida was extremely bad. Brought in from the fatigues of the war-path and the destitution of their hunted camps, they were taken from the clear, dry, and rarefied air of Arizona to the humid atmosphere and debilitating climate of the Florida sea-coast. They were supplied with rations and clothing, but were crowded into damp and improperly ventilated quarters.

Here the first effects of such radical change of environment began to manifest themselves, and clearly pointed to the necessity of an attempt to better their condition. Their removal to Mount Vernon Barracks effected a temporary improvement ; as on their arrival there they were placed in tents, while a village of log-cabins for their occupancy was being built. This village was completed before the end of the year ; but the cabins were of the worst type of construction, and the site was unsanitary, being in a low, damp hollow so shaded by trees that free circulation of air and penetration of sunlight were greatly interfered with—a serious matter where, as in Southern Alabama, the humidity of the atmosphere is great and the rain-fall excessive.

They lived in this village for four years, during which time its condition and the health of the Indians became so bad that finally it was found necessary to build another ; and in 1891, a much better village of framed houses was built on a hill near by, where the disadvantages of the old site did not obtain. In May of the same year, forty-six of the able-bodied men were enlisted as privates in the United States Army, forming Company I, Twelfth Infantry, which was increased

by the arrival of thirty-two Tonto Apaches from Arizona, some two months later. Captain W. W. Wotherspoon, U. S. A., who had been placed in charge of the Indians shortly before, and by whose efforts the building of the new village was undertaken, was given command of the company, and ably instituted reforms in the general and sanitary condition of the community. A commodious barrack was built for the Indian enlisted men ; and a hospital with male and female wards was completed the same year. By these means the condition of the community was greatly improved.

In fact, as regards its sanitary condition during the five years for which statistics are given, there are two distinct periods.

During the first period of about four years, they lived under the unsanitary conditions of bad location, wretched habitation, and accumulating filth. Their village was on a damp and overshaded soil, and their cabins were of the worst construction. They were built of rough logs, with mud or rough board floors, and with windows too small to admit sufficient sunlight. The roofs leaked, and the crevices between the logs were imperfectly closed. They, therefore, afforded but poor protection against the inclemency of the weather, and were damp, gloomy, dirty, and in every way unsanitary. The Indians, being unused to living in permanent dwellings, allowed dirt to accumulate in and about them, as they were accustomed to do with their temporary "wickyups" in Arizona. The latter, however, being frail structures of poles and brushwood lasted but a short time, and were generally abandoned before dirt had accumulated to an unsanitary extent, while the cabins, being permanent, gradually accumulated filth, until they became veritable incubators of disease.

The Indians themselves were in no better condition than their habitations. They received regular and abundant issues of rations and clothing ; but as none of them were regularly employed at paid labor, they were without money, and, although forbidden, they sold all they could of both food and clothing to obtain it. The money so received they spent to no advantage to themselves.

Captivity, unaccustomed restraint, and enforced idleness operated to prevent the mental stimulus of personal endeavor,

and combined with their unsanitary surroundings to produce a condition of mental and physical demoralization. As a result, the death-rate (see Table I.) gradually increased until for the year ending June 30th, 1891, it reached the extremely high rate of 142 per 1000 of living.

During the last period of one year, beginning July 1st, 1891, the condition of the community was improved in all ways.

Their new village, being on the crest of a hill, has plenty of sunlight and free circulation of air. The houses are of fairly good construction, are well lighted by good-sized windows, are plainly built, and are easily kept clean.

The enlistment of many of the men, and the employment of most of the others at paid labor about the village and garrison, removed the demoralizing effect of enforced idleness, and gave the Indians a mental stimulus the effects of which can hardly be overrated.

They are now well clothed and well supplied with the necessities of life, while cleanliness of person and habitation is enforced by rigid military inspections and method. The Indian company, in neatness and in the well-kept condition of its barrack, compares favorably with any white company in the United States Army.

The improved condition of the community during the last year, over that of the preceding four years, is shown by the following extract from a report of an inspection made by Colonel Charles Page, Medical Director of the Department of the East, in which he says : " The Indian camp and hospital have been much improved and the quarters with surroundings occupied by the prisoners are as clean as those occupied by the soldiers. The transformation from squalor to neat and tidy condition of quarters and grounds is remarkable."

This bettered condition produced a marked effect upon the mortality of the community, and the death-rate fell (see Table I.) from 142.58 per 1000, of the preceding year, to 109.75. The number of deaths from all causes except tuberculosis fell (see Table II.) from 35 to 18 ; and had the deaths from tuberculosis decreased in like ratio, the death-rate would have been lowered remarkably. Instead of this, the deaths from tuberculosis decidedly increased in number—the germs

of the disease having been so thoroughly disseminated during the preceding years.

This general description of the condition of these Indians during the five years will make clear the circumstances under which the following statistics were produced :

TABLE I.—*Showing the mean number, according to age and sex, of Apache Indians present at Mount Vernon Barracks, Ala., for each of the five years beginning July* 1, 1887, *and ending June* 30, 1892 ; *the number of deaths according to age and sex ; the number of births ; and the birth and death rates per* 1,000 *for the same years.*

YEAR.	Mean Number Present (Corrected for Time).				Deaths.				Births.			Death-rate per 1,000.	Birth-rate per 1,000.
	Men.	Women.	Children.*	Total.	Men.	Women.	Children.*	Total.	Males.	Females.	Total.		
1887–88..	78	170	118	366	1	11	8	20	9	8	17	54.64	46.44
1888–89..	86	179	123	388	2	7	10	19	7	10	17	48.96	43.66
1889–90..	92	176	124	392	6	13	24	43	6	28	34	109.69	86.73
1890–91..	99	165	107	371	9	11	33	53	10	8	18	142.58	48.51
1891–92..	122	169	119	410	10	11	24	45	16	15	31	109.75	75.61
Totals..	....	....	....	....	28	53	99	180	48	69	117		

Mean death-rate for the five years.....93.12
Mean birth-rate for the five years.....60.19
Excess of deaths over births.....63
Excess of female births over male.....21

The high birth and death rates at once attract attention. The mean birth-rate of 60.1 is nearly double that of civilized communities. The general average in European countries for 1882 was 34.1 per 1000 of population, the lowest rate being 24.8, and the highest 44.6, while the lowest rate of this community during the five years was 43.6, and the highest 86.7.

The mean number of women over twelve years of age, present during the five years, was 171 ; and as there were 117 births, the number of births during that time was equal to 68.4 per cent. of the mean number of women present, includ-

* Under twelve years of age. The division is made at this age, as official record is so kept on account of those over twelve receiving a full ration from the Government, while those under that age receive one half a ration.

ing those past and those who had not reached the menstrual period.

During the year of lowest birth-rate there was one birth to every ten women ; and during the year of highest rate, one woman in every five gave birth to a child.

There are two main causes for the high birth-rate : great freedom of union of the sexes, and the practice of polygamy.

By great freedom of union of the sexes, unchastity is not meant, but, as most of the conditions which with a civilized people lead to sexual restraint, do not obtain with these Indians, early union of the sexes occurs, and the ties so formed are easily broken that other connections may be made. Infidelity is rare during their marital alliances, but these alliances are generally broken at the caprice of either party. The wife is usually obtained by purchase ; but curiously, the right of the parents, and particularly of the mother, to a daughter so disposed of, does not end with her marriage. The husband only retains her during their approval ; and payments of money or other valuables are extorted from him under threat of taking her from him. Curiously, also, the right of the mother seems not to be questioned by the married daughter ; and she, obediently and apparently willingly, returns to her parents when, deeming that insufficient tribute is paid, they order her to do so.

Polygamy is practised ; and as the women approach the menopause, the men form new ties with younger women. It will be seen that the family is not developed as with civilized people, but that sexual relations are generally formed on the basis of sexual activity.

As shown by Table I., the women are about double the men in number ; but the practice of polygamy, and of the men taking younger wives when the older are past the child-bearing period, gives as great opportunity for all the women to bear children as there would be in a community where there was an equal number of each sex. In consequence of the excess of women, it must be borne in mind, when comparing the birth-rate of this community with that of a civilized people, that an increase of men would not increase the births, but would decrease the birth-rate.

At the same time, consideration must be given the proba-

bility that this condition is a normal one for this and other uncivilized people—the greater exposure of the men from warfare and other conditions of life probably tending constantly to keep their number reduced below that of the women.

It may be well to state that it does not follow, because of their practice of polygamy and the ease with which their marriages are made and broken, that these Indians are immoral. Their standard of morals is different from that of a people of higher civilization. It is in keeping with their conditions of life and stage of race development ; and, judged by it, they have always been considered virtuous. They are quite free from venereal diseases. During the five years there were treated but two cases of syphilis, one case of urethral stricture, one of gleet, and thirteen cases of gonorrhœa. As before stated, there are but five individuals of mixed (Indian and white) blood in the community.

It is claimed by persons having long acquaintance with these Apaches, that they have always practised infanticide of all infants of mixed blood ; but as they have never well affiliated with the whites, it is probable that occasion for such practice has been infrequent. During the five years of close observation at Mount Vernon Barracks no instance of such practice has been observed ; and but one half-breed child has been born.

What effect if any their changed environment has had upon the birth-rate of these people is difficult of determination.

Their enforced idleness during the first four years, so different from the activity of their former nomadic life, may have had a tendency to increase the rate ; but, on the other hand, it would seem that a decreased rate would be produced by the high death-rate and the increased amount of sickness which would necessarily accompany it.

How high the death-rate was will be seen from Table I., which shows a minimum rate of 48.9, a maximum of 142.5, and a mean of 93.1 per 1000 of living ; so that, in spite of the very high birth-rate, the deaths exceeded the births by 63.

The following table shows the causes of death which produced this high rate, and the relative frequency of each cause :

TABLE II.—*Showing the causes of death, the number of deaths from each cause during each year and during the five years, and the percentage of deaths from each cause to the total number of deaths.*

CAUSES OF DEATH.	Number of Deaths Each Year.					Total, Five Years.	Per Cent.
	1887–88.	1888–89.	1889–90.	1890–91.	1891–92.		
Tuberculosis	11	4	18	18	27	78	43·33
Scrofula	..	..	..	1	.	1	·55
Chronic rheumatism	..	..	..	..	2	2	1.11
General debility, adults	1	1	..	..	..	2	1.11
Old age	2	4	..	2	..	8	4.44
Malnutrition, children	..	1	3	5	1	10	5·55
Acute diarrhœa	..	3	7	13	3	26	14·44
Chronic diarrhœa	1	1	5	4	2	13	7.22
Obstruction of bowels	..	1	1	..	..	2	1.11
Peritonitis	1	..	..	3	1	5	2.77
Stomatitis	..	..	..	1	1	2	1.11
Asphyxia of new-born	1	..	1	..	..	2	1.11
Croup	..	..	..	..	2	2	1.11
Capillary bronchitis	..	..	..	1	1	2	1.11
Chronic pleurisy	1	..	..	..	..	1	·55
Pneumonia	1	1	3	..	..	5	2.77
Asthma	..	..	..	..	1	1	·55
Acute nephritis	..	1	..	..	..	1	·55
Chronic nephritis	1	..	..	1	..	2	1.11
Convulsions	..	1	1	..	..	2	1.11
Erysipelas	..	1	..	..	..	1	·55
Poisoned, Indian medicine	..	..	2	2	1	5	2.77
Suicide	..	..	..	..	1	1	·55
Unknown, infant	..	..	2	2	2	6	3·33
Totals	20	19	43	53	45	180	100.00

This table shows at once that tuberculosis, diarrhœal diseases, and malnutrition of children were the great causes of death.

Of the total of 180 deaths, 78, 43⅓ per cent were caused by tuberculosis alone; while malnutrition of children and diarrhœal diseases together caused 49 deaths, or 27⅕ per cent, leaving but 53 deaths, or 29⅖ per cent, for all other diseases. It is plain from these figures that the high death-rate of these Indians is due, primarily, to the prevalence of tuberculosis among them, and secondarily, to diseases of the alimentary organs. The reasons for the prominence of intestinal disease as a cause of death are readily ascertained. Most of the

deaths from diarrhœal diseases were of children, as will be seen from the following, which gives the number of adults and of children dying of these diseases :

	Infants.	Adults.	Total.
Acute diarrhœa	21	5	26
Chronic diarrhœa	11	2	13
Totals	32	7	39

So that of the 39 deaths from diarrhœal diseases, the large number of 32, or 82 per cent, were of children. These 32 deaths, added to the 10 deaths of children from malnutrition, account for 42 of the 180 deaths.

The infant mortality of civilized people is notoriously high ; and it is naturally to be expected that with these people the rate would be still higher, as the great causes of infant mortality—namely, ignorance in regard to the proper care and feeding of children, would exist in greater degree. Improper care exists at all times ; improper feeding generally does not begin until the time for weaning approaches. It is rare to find an Indian mother who cannot nurse her child, for in the past, in those cases where the child could not be nursed, it died, so, gradually, through the law of the survival of the fittest, a race was produced whose women can nurse their children—a condition general with uncivilized people—the resources of civilization being necessary to produce the common occurrence of deficient mammary function by saving the lives of non-nursing mothers and so transmitting the tendency. But, when weaning occurs, the Indian children pass directly to the diet of the adults ; and as the diet range of the Indians is limited, and their knowledge of cooking very imperfect, children with weak digestion are almost sure to contract acute bowel complaints, which, aggravated by continued improper feeding, generally prove fatal.

The improper feeding of children was undoubtedly as common with these Indians previous to their removal from Arizona as it has been since, but other disease-predisposing factors have been added by their change to their present place of abode, which have helped to produce a high infant mortality. In the hot and moist air of summer, which prevails in Southern Alabama during seven months of the year, putrefactive

changes quickly occur; the improperly kept and poorly cooked food of the Indians is apt to take such change, and is, consequently, often given to the children when in anything but proper condition. From the elevation of Arizona and New Mexico, the air there is dry, and putrefactive changes are much less apt to occur. There the Indians habitually preserve their meat by drying in the sun and air; but in Southern Alabama meat so treated (and the Indians from habit still attempt to so cure it) almost invariably spoils, and is frequently eaten by them and fed to the children after it has begun to decompose.

To improper feeding is added improper clothing. During the first four years the clothing of the children was insufficient to protect them against the ill effects of temperature changes; and this, together with great dampness of the ground from frequent rains, had great effect in producing, or predisposing to, intestinal catarrhs.

It is probable, therefore, that the change of climate from Arizona to Southern Alabama, together with the unsanitary conditions of the first four years, produced a decided increase of infant mortality from intestinal diseases. But, while the death-rate from these diseases was very high, that from tuberculosis was still higher; and the effect of changed environment in producing a high death-rate from this disease was most marked. How fatal tuberculosis was, and that it was the main cause of death, is shown by Table II. and by the following table or tabulated comparisons:

TABLE III.—*Showing comparative death-rate for* 1,000 *living.*

	Men.	Women.	Children.	Total.
Mean number present during the five years	95.4	171.8	118.2	385.4
Died of tuberculosis	21	29	28	78
Died, all other causes	7	24	71	102
Died, all causes	28	53	99	180
Death-rate, from tuberculosis	42.53	32.67	46.1	40.45
Death-rate, all other causes	14.17	27.03	116.8	52.65
Death-rate, all causes	56.7	59.7	162.9	93.10

Death-rate, England and Wales, all causes, 1881–90 ..... 19.15
Death-rate, England and Wales, tuberculosis, 1881–90 ..... 2.15

The death-rate of the men, women, and children from tuberculosis is remarkably similar for so small a number of observations, and shows how uniformly fatal the disease has been.

While the mean death-rate of the world from tuberculosis is not far from 2 per 1000 of living, the average death-rate of this community from it has been 40.35. This rate shows the virulency and epidemic quality of this disease in this community ; for the rate exceeds that of cholera in the worst infected districts during an epidemic, and is more than four times greater than was the rate from small-pox in London during the years from 1771 to 1781, when the latter disease was at its height.

The high death-rate of the children, from causes other than tuberculosis (116.8), is accounted for by the prevalence of diarrhœal and malnutrition diseases, before referred to.

The death-rate of adults, from causes other than tuberculosis, 14.17 for the men and 27.03 for the women, is not high, being a mean of only a little over 20 per 1000 of living, which is about that of the world at large ; so that, so far as the adults are concerned, had their mortality-rate from tuberculosis been the usual one of 2 per 1000, their rate, while high for adults, would have been but 22 per 1000 of living.

It is generally accepted, however, that the death-rate of Indians from tuberculosis is always greatly increased whenever they are confined to given localities and their usual habits of free life interfered with. Nor can such increased death-rate be considered strange, for, in their natural state, an unconscious adaptation of themselves to their environment has taken place for them by which a normal balance of life is obtained.

The Apaches have lived for generations in the clear, dry, rarefied air of the Rocky Mountain uplands. Their habitations are of the frailest kind, open to the drying air and penetrating sunlight of those regions. From their nomadic habits, they move frequently from place to place, leaving behind them the dirt accumulated by living, and abandoning their frail and soiled habitations for new ones. When one of their number dies, the habitation in which the death occurs is burned, and the belongings of the deceased person are also burned or buried. In this way, by abandonment and burning —natural disinfection methods—communicable diseases, of which tuberculosis is one, were in large part avoided.

Only through long generations of gradual adaptation and natural training can a nomadic people adjust themselves to

the living requirements of permanent habitation. With these Indians the experiment was made—unintentional as an experiment, it is true—of taking them suddenly from nomadic life and thrusting them unprepared by previous natural training into a life of quiescence and permanent habitation. The result is shown by the extremely high death-rate, particularly from tuberculosis. The relative frequency with which this disease in its different forms caused death among the men, women, and children is given in the following table :

Forms of Tuberculosis.	Deaths from each Form.			Totals.	Per cent.
	Men.	Women.	Children.		
Pulmonary.....	19	27	11	57	73
Enteric.....	1	2	11	14	17.9
Meningeal.....	..	..	6	6	7.6
Acute.....	1	..	..	1	1.2
Totals. ....:.....	21	29	28	78	

The frequency of pulmonary tuberculosis as a cause of death with adults, and of enteric and meningeal forms with children, is noticeable, and in keeping with general observations upon this disease.

The great frequency in children of mesenteric tuberculosis has been frequently observed before, and the ingestion of infected milk has been considered as the main cause. This view seems to be supported by these statistics, as the prevalence of tuberculosis among the mothers would, in this way, produce many cases other than pulmonary, even were the children not infected when born.

The great predominance of pulmonary tuberculosis among the adults is also in keeping with general observations—the infection with them generally occurring by way of the lungs.

It is not so plain why deaths from this disease have been proportionately so much greater among the men of this community than among the women, unless it is that the somewhat less active life of the women has given them a certain degree of immunity. It is more probable, however, that this is not the case, and that no such difference would be found if the numbers from which the statistics are derived were

larger. In fact, the whole question of immunity to tuberculosis, and of the different susceptibility of different races to this disease, is not yet settled. It is well known that certain races, as the nomads of Persia, Syria, and Armenia, and the inhabitants of certain localities, as those of Iceland and the islands of Faroe, Shetland and the Hebrides, are almost, if not entirely free from the disease ; while among negroes in this country, and Indians, when under restraint and in contact with civilization, it is particularly prevalent. It is also known that under changed conditions the same race exhibits an apparently varying susceptibility to the disease, as is shown by its appearance among the nomadic races above referred to as soon as they abandon their wandering life.

Also, it is known to vary according to differences in locality or climate ; its spread being favored by vitiated and damp air and a moist soil, and retarded by purity and dryness of the air, and a large amount of sunshine. In view of these facts, it seems probable that tuberculosis acts as does any other infectious disease, being most prevalent where the conditions favoring its spread most obtain ; and that the presence of these conditions, more than racial or individual susceptibility, are the important factors favoring its prevalence. This view is supported by the death-rate from this disease of the community under consideration.

For some months previous to their arrival at Mount Vernon Barracks, and during the first four years of their stay there, all the conditions most favorable to the spread of the disease existed ; and the deaths from it ran as follows : First year, 11 ; second year, 4 ; third year, 18 ; fourth year, 18 ; fifth year, 27.

During the fifth year, though the condition of the Indians was greatly improved, the number of deaths from this disease was greater than before, as the disease had gained such a foothold during the preceding four years that no decrease could be looked for in so short a time. The disease is so slow in development and in running its course, that when unusually prevalent in a community, no sudden return to ordinary rates can be expected, but only a slow decline made possible by most thorough sanitary measures.

Whether the system of disinfection and enforced cleanliness

now being carried out in this community, together with its bettered condition, will be effective in staying the ravages from this disease remains to be seen, for the unfavorable conditions of changed climate and altered modes of life still remain.

It is to be hoped, however, that this most insidious of diseases can be controlled by the means taken, and notwithstanding that the past five years have shown a steady increase of the disease, due to the presence of all the conditions most favorable to its spread, that the following years, through the absence of many of these conditions and the use of suppression methods, may show a steady decline.

Should such decline occur, it will be of interest in that it will show the adaptation of the community to its new environment, and the effectiveness of modern sanitary methods, when enforced.—*Boston Medical and Surgical Journal, July 6th*, 1893.

WATER FILTRATION AND CHOLERA.*

By Professor R. Koch, of Berlin.

By all investigators of cholera whose judgment has not been warped by fantastic fancies as to telluric or cosmic influences, or by a wilful adherence to theories refuted long ago, a more or less great importance has always been attributed to water as a conductor of cholera infection. The opinions differ only in this—as to how great was the influence of water. Several have gone distinctly too far in this respect, in that, led by occasional surprising observations, they declared water to be the exclusive conductor of the cholera germ. As to these,

* *Separat-Abdruck aus der Zeitschrift für Hygiene und Infections-Krankheiten.* (Translated from the German by Albert Ball, Esq., B.A., of the Local Government Board.) Vol. xiv., 1893. The translator has often preferred to translate Professor Koch literally rather than to risk sacrificing his meaning by a choice of more appropriate English.—*The Practitioner, August*, 1893.

the designation much in vogue in recent times of "water fanatics" or "water theorists" may be not improperly used. That I do not belong to this class of cholera investigators will be readily admitted by every one who knows what I have up to now said and written about cholera. I have always contended that according to past experience the direct communication of cholera from person to person was possible, though, by all appearances, it did not occur very frequently; but that, on the other hand, in the real epidemics and great outbreaks of cholera, the chief importance is to be attributed to indirect transmission through various agencies of the cholera germs, and that water is one of the most important among these. From some examples I have also tried to show further that under certain conditions water has played the *rôle* which has been attributed to it; but so far as my knowledge goes I have never expressed any opinion as to the extent to which this factor is to be considered as sufficient. A definite judgment on this point could not be formed at present, since the earlier investigations as to the relations of cholera to water were always made from a one-sided point of view, and were therefore seldom free from objection. Why, under these circumstances, they wish to make me out to be a "drinking-water fanatic" I cannot properly understand. It almost looks as if it were wished to force on me those opinions which could most easily be refuted.

In the last epidemic, as no one who is in earnest would dispute, water played a very important part. Nevertheless, we cannot even now know whether this will be the case in the future, and it is certainly better to defer a definite judgment as to the extent of the influence of water until we have collected further and more sufficient experience. But last year has again shown that we have every reason in the future to give our greatest attention to water-supply.

The cholera epidemic in the three towns of Hamburg, Altona, and Wandsbeck, has been in this respect instructive in the highest degree. These three towns, which are contiguous to each other, and really form a single community, do not differ except in so far as each has a separate and a different kind of water-supply. Wandsbeck obtains filtered water from a lake which is hardly at all exposed to contami-

nation with fæcal matter ; Hamburg obtains its water in an unfiltered condition from the Elbe above the town, and Altona obtains filtered water from the Elbe below the town. Whereas Hamburg was notoriously badly visited by cholera, Wandsbeck and Altona—if one excepts the cases brought thither from Hamburg—were almost quite free from the disease. Most surprising were the conditions of the cholera epidemic along the boundary between Hamburg and Altona. On both sides of the boundary the conditions of soil, cultivation, sewerage, population, all things, in short, of importance in this respect, were the same, and yet the cholera in Hamburg went right up to the boundary of Altona and there stopped. In one street which for a long way forms the boundary there was cholera on the Hamburg side, whereas the Altona side was free from it. Indeed, in the case of a group of houses on the so-called Hamburger Platz, the cholera marked out the boundary better than any one having the map of the frontier between Hamburg and Altona before him could have done. The cholera not only marked the political boundary, but even the boundary of the water-distribution between the two towns. The group of houses referred to, which is thickly populated by families of the working class, belongs to Hamburg, but is supplied with water from Altona, and remained completely free from cholera ; whereas all around on the Hamburg territory there were numerous cases of disease and death. Besides this group of houses there is, on the Hamburg territory, only the brewery in St. Pauli, which obtains its water from Altona. The assertions that there were other houses at Hamburg which received their water-supply from Altona, and yet had cholera, and that there were houses in the town of Altona which received their water from Hamburg without suffering from cholera, are completely untrue, as I can most certainly assert on information personally obtained by me in Altona and Hamburg. Here we have to do with a kind of experiment which was performed on a population of over 100,000, but which, in spite of its immense proportions, complied with all the conditions which one requires from an exact and perfect experiment in a laboratory. In two great populations nearly all the factors are the same, one only is different, and that the water-supply. The population supplied with unfiltered water

from the Elbe is seriously visited by cholera ; the population supplied with filtered water is only visited by the disease to a very small extent. This difference is all the more important as the water of Hamburg is taken from a place where the Elbe is relatively but little contaminated ; but Altona resorts to the water of the Elbe after it has received all the liquid and fæcal refuse of 800,000 people. Under these conditions there is no other explanation for the scientific thinker but that the difference in the incidence of the cholera on these two populations was governed by the differences in the water-supply, and that Altona was protected against the cholera by the filtration of the water of the Elbe.

It will not do to ignore this fact, and the only course open to us is to endeavor to show its bearing on the nature of cholera. As in this case we are dealing with an epidemiological fact of the first importance, which is before us perfectly clear and transparent, and which because of its easy access can later on be tested and supplemented in every direction as to the correctness of the observations, and which therefore is in this respect quite unique, we have a right to demand of every investigator of cholera who claims consideration for his opinion that he should face this fact and should take up a definite attitude with regard to it.

For a bacteriologist there is nothing easier than to give an explanation of the restriction of the cholera to the territory of the Hamburg water-supply. He need only point out that cholera bacteria were brought into the Hamburg water either from the Hamburg sewers or, what is much more probable, from the excrements of persons suffering from cholera who were living on the boats anchored near the place from which the water-supply was obtained, and then assume that afterward more or less numerous cases of cholera must occur among those who use this water according to the degree of its impurity. The town of Wandsbeck was spared because its water was not exposed to a contamination of this character, and was, moreover, filtered. Altona obtained water which at its source was much worse than that of Hamburg, but which by careful filtration was completely or nearly completely freed from cholera bacteria. This view is in complete accordance with all past bacteriological experiences, and, with our present

knowledge respecting infectious matter, it contains no contradictions and is not forced or artificial.

Why one should wish to attribute the Hamburg-Altona cholera to cosmic, telluric, or purely meteorological factors, is a puzzle to me ; for sky, sun, wind, rain, etc., were absolutely equally distributed on the two sides of the boundary of the territory. I hardly think that any attempt will be made to find an explanation from this point of view.

I was particularly interested in what the " soil-theorists," or " localists," as they now prefer to call themselves, would say about the Hamburg-Altona cholera. Thus far they appear to admit, though somewhat involuntarily, the fact that the real epidemic remained restricted to the territory which obtained unfiltered water from the Elbe, and that therefore the unfiltered water must have exercised some influence ; but the explanation as to how this influence made itself felt through the medium of the soil is given in so unsatisfactory a manner that I should hesitate to discuss it if it did not come from so respected an authority.

The " localistic" view is to the effect that the water did not have an " infective," but a " predisposing" influence ; that in this way the unfiltered water brought filth into the dwelling, into the streets, and to the soil, and that it thus created a suitable soil favorable to the development of the cholera germ. But the respected " localist" has in his difficulty not considered how immeasurably small the amount of filth is which through the use of water, even in unfavorable circumstances, can be brought into the dwellings and to the soil, compared to the much greater quantities of filth which daily life brings to the dwelling, and which is continually being accumulated in streets and courts by men and animals. He has also not considered that the Elbe water which is taken in at the water-works does not receive regularly, but only quite exceptionally, and this at high tide, an admixture with the sewage of the town of Hamburg. He appears, however, and that is the greatest objection that can be made to his contention, to have completely forgotten that Hamburg is one of the very best drained towns, and that it is supplied with contrivances which convey the filth in the quickest way possible from the houses, courts, and streets, beyond the limits of the

town. What, indeed, is the use of drainage if it is not able to remove and render harmless so small an addition of organic matter as is brought in by unfiltered water. The soil theory could not have given a more perfect proof of its complete failure than by making this unfortunate attempt at an explanation.

In any case the "localists" will in future have to look upon the filtration of water not as a secondary matter, but as a very useful and, under certain circumstances, indispensable measure. And here, again, we see what is seen in so many other cases, that one can have different views as to the explanation of a fact, but that one nevertheless arrives at the same result as regards practical treatment.

The Hamburg-Altona cholera has given us an indisputable proof that the filtration of water by sand, in the way in which this is done at Altona, gives a practically sufficient protection against cholera infection. I specially say that if the filtration is to be a protection, it must be performed as it is in Altona. I know a fairly large number of water-works with methods of filtration, and I know that only a few of them keep so strictly to the rules which are now considered best for the filtration of water as Altona does, and I have every reason to suppose that the protection from cholera would not everywhere have succeeded so well as in Altona.

In order to make myself intelligible to those readers who have no special knowledge of the *technique* of water filtration, I must now consider more closely some of the procedure which takes place in filtration by sand.

The problem of filtration is to purify water from the matter held in suspension. Matter which has been dissolved goes through the filter with hardly any or with no perceptible change. As the chemical investigation of water has chiefly to deal with inquiry into the constituents which have been dissolved, it cannot aid in studying the processes of filtration. But in earlier days one was so much accustomed to judge the character of water according to its chemical characteristics that, in complete ignorance of what took place in the process of filtration, one attempted to test and regulate the process chemically. Naturally no useful result ever came of this. The specialists in filtration had found this out even in early

times, and had attempted to obtain aid in some other way. They tested the water in glass or metal cylinders, the so-called "water-tests," as to its transparency before and after filtration, and according to the result they judged of the value of the sand filters. By this simple means they succeeded in discovering the most important conditions for a sufficient purification of water from its suspended constituents. From this it appeared that the real filtration does not take place in the sand, but that, by deposit from the still unpurified water, a layer of mud is formed on the top of the sand, and that this layer of mud, which is over the sand, is the real filter which retains the suspended constituents from the water. In the process of filtration the important point is first that a proper layer of slime should be formed, and that it should not be disturbed during the process of filtration, and that when by further continuous deposit it becomes too thick and therefore too impermeable to water, it should be removed. According to all appearance different natural waters are capable of producing the filtering mud layer in very different degrees, according to the amount of mineral and vegetable matter held in suspension. Some river waters which are especially rich in clayey constituents can deposit a good filtering mud layer in eight or ten hours. Other kinds of water rendered more turbid by vegetable matter require a longer time—at least twenty-four hours—to form this deposit. At certain periods of the year, especially at the time of the so-called "water-bloom," owing to the appearance of innumerable microscopic algæ, the vegetable constituents suspended in the water are increased to an extraordinary extent and are of a particularly slimy character, and form therefore a layer which in a few days becomes nearly impermeable to water and must be removed. From these brief remarks it will appear that in sand filtration we are not dealing with so simple a matter as is often supposed. It has also been discovered that in the gradual wearing out of the sand layer it should never be allowed to get below a certain thickness, about 30 cm., and that a certain speed, about 100 mm. in the hour, must be allowed for the movement of the water through the sand layer to obtain the most perfect purification. Some further rules of filtration of less importance need not be noticed here;

those which I have given are the most important, and are sufficient to an understanding of that which follows.

If in the process of filtration any disturbance takes place, and the above-mentioned rules cannot therefore be observed, this will at once show itself in the character of the filtered water. It no longer obtains the complete transparency when examined by the water-tests. To the consumer this, it is true, is hardly ever noticeable, for the water even insufficiently purified will still appear clear in water bottles and in drinking glasses. Partly on this account, partly because the disturbances in the process of filtration, as a rule, continue for only a short time, in earlier days no great importance was attached to these disturbances, and often it was not considered to be even necessary so to construct water-works as to exclude from consumption water which had been insufficiently purified.

That is, however, all changed since we have obtained better knowledge as to infectious matter, and have become persuaded that water by the process of filtration must not only be rendered more clear, but, above all, must be freed from the infectious matter which has got into it. In order to test water as regards the amount of infectious matter contained in it, the "water-tests" are of course insufficient, and for this purpose bacteriological investigations are requisite, and have been recognized as the only trustworthy means in order to test the sufficient purification of water by a process of filtration. The application of bacteriological investigations to the study of the processes of filtration has confirmed generally what was previously known on the subject; but it very soon led to the discovery that even slight and quickly passing disturbances in the process are not to be regarded as unimportant, as used formerly to be the case. If a filter works satisfactorily in every respect, there will be found, as experience shows, less than 100 germs capable of development in one cubic centimetre of filtered water; and this is independent of the amount of bacteria contained in the natural water, whether such amount should be 100,000 or only a few hundred in a cm. If the rate of filtration is 100 mm. in the hour, differences in the natural unfiltered water as regards the amount of bacteria it holds may be of value in determining the amount of bacteria in filtered water, but this last amount should, even in

the case of very contaminated natural water, never come to more than 100 germs in a cubic centimetre. But the slightest disturbances in the process of filtration—for instance, the quickening of the rate of filtration to over 100 mm.—disturbances of the surface mud covering, etc., lead as a consequence to an immediate increase of germs in the filtered water. The small number of germs which remain, even when the process is perfect, is due doubtless chiefly to the filtering material being covered with a growth of bacteria, and, in short, due to the fact that the lower sand layers and the gravel and stone layers, like all objects washed by water, in the process of time become covered with vegetable micro-organisms. These are naturally harmless inhabitants of water, which can be found in all water, and which do no injury. A small proportion of the bacteria found in filtered water have their origin, according to the investigations of Fraenkel and Piefke, in the natural water. The very best filtration processes are not sufficient therefore to keep back all micro-organisms. Even this must be possible of attainment, but one would have to filter at an even slower pace, perhaps also through thicker strata, and using other filtering materials, and this would lead to so great an increase in the size and expense of the water-works that it would hardly be practicable. According to all appearances, we have with the present processes reached the limits of that which is practicable.

But the best proof that we can be satisfied in practice with what we have already attained is shown by Altona in last year's epidemic. The water-works of this town, which are under the superintendence, fortunately, of one of our ablest and most experienced specialists in filtration, never during the epidemic allowed the pace of the filtration to go beyond 100 mm., and it is thanks to this precautionary measure that Altona was visited by the cholera in so small a degree. According to my information as to the statistics of cholera in Altona, there occurred about 500 cases of disease there, of which at least 400 were brought from Hamburg, or were proved to have been due to the traffic of the harbor, or to have been communicated immediately from cases there. Of the 100 other cases, of which one cannot discover the direct or indirect connection with Hamburg, a certain number prob-

ably had their origin there, although no direct connection can be traced. Whether of the remainder which occurred independently at Hamburg, and which really formed the epidemic in the town of Altona, a certain number of cases can be ascribed to the imperfect purification of the infected Elbe water through the sand filters, it is now impossible to determine. But I consider it to be very probable that, according to the investigations of Fraenkel and Piefke, if the pace of filtration is 100 mm. the bacteria of cholera cannot be completely kept back by the sand filters. In any case, the number of the cases which occurred at Altona in this way was not of importance, and one cannot demand that in order in future to avoid with certainty the possibility of such occasional cases one should give double or treble dimensions to the existing sand filters. We must therefore admit that, according to all that we have learned about sand filtration, even under favorable circumstances, it cannot give absolute protection against the danger of infection ; but, as we have already said, it can give such a protection that in practice we may, under existing circumstances, be satisfied with it.

In itself this result will in times of cholera tend to calm our minds as regards those towns which make use of sand filtration ; but the present cholera epidemic has unfortunately taken care that this calm must not be considered as quite justified. It has shown us by some remarkable examples that the mere provision of filters is not in itself sufficient, but that they must be constructed perfectly in every respect, must then be superintended with the greatest care, and be continually tested by bacteriological investigations, if the protection which they are expected to give is not to be more or less illusory. The cases which have put us in some uncertainty as to the result of filtration by sand are those of the cholera epidemic at Nietleben, near Halle, and of the winter epidemic at Altona. These are so instructive that they deserve further consideration.

(*To be continued.*)

THE TRAINING SCHOOL FOR THE NAVAL MEDICAL SERVICE.

NAVY DEPARTMENT, WASHINGTON, D. C., June 22, 1893.

RULES and regulations prescribed under Circular No. 52 of this date (attention is directed to Article 198, p. 48, U. S. Navy Regulations).

I. Assistant surgeons as soon as commissioned will be ordered to said establishment, and will be required to faithfully perform their duties while undergoing instruction. They will also be furnished with a copy of this circular, and their names registered in accordance with prescribed form contained in book supplied by Bureau of Medicine and Surgery. This book will be kept on file in Department of Instruction for future reference.

II. The course of instruction will continue for a period of at least three months, and will embrace the following subjects :

1. Chemistry, general, analytical, and organic.
2. Hygiene and sanitary science.
3. Microscopy and microbiology.
4. Military surgery and operative work.
5. Clinical medicine and hospital work.
6. Construction and ventilation of modern war ships.
7. Examination of recruits and life-saving methods.
8. Navy regulations, navy ration, hospital fund, pension fund.
9. Keeping medical records at hospitals and on board vessels of war, and blank forms pertaining to Bureau of Medicine and Surgery.

III. The director in charge of the U. S. Naval Laboratory and Department of Instruction will assign assistant surgeons to the Naval Hospital, New York, for careful and thorough instruction in the following branches :

CLINICAL MEDICINE AND HOSPITAL WORK.

Bedside examination of patients, visiting hospital with medical staff at morning visit, studying and investigating carefully the etiology of disease, as associated with naval life,

and the diseases to which sailors are chiefly susceptible, giving attention to and becoming familiar with the technique of the laryngoscope, ophthalmoscope, practice with trial lenses in helping to determine the nature and degree of errors of refraction, thermometer, stethoscope and sphygmograph, preparation of temperature charts, diet lists, etc., as aids to accurate diagnosis, etc.

NAVY REGULATIONS, NAVY RATION, HOSPITAL FUND, PENSION FUND.

Navy Ration.—General history of diets, including steps leading to the present recognized principles ; general considerations in relation to health and disease, efficiency of force and mortality in time of war ; diseases depending upon dietetic deficiencies, with the historical accounts relating thereto ; origin of the U. S. Navy ration, original component parts, with the nutritive and dynamic values and changes at various times, with the effect on values ; a study of present U. S. Navy ration in all relations, including comparisons in nutritive and dynamic values with the rations of foreign navies, and considerations in connection with work done in different climates and parts of ship ; spirit ration ; condiments ; tea and coffee ; packing and preserving methods.

Pension Fund.—When established ; acts of Congress relating thereto ; trustee of pension fund ; amount of pension fund ; how invested ; those entitled to benefit of fund ; sources of income to pension fund.

Hospital Fund.—Sources from which derived, and how utilized.

KEEPING MEDICAL RECORDS AT HOSPITALS AND ON BOARD OF VESSELS OF WAR, AND BLANK FORMS PERTAINING TO BUREAU OF MEDICINE AND SURGERY.

Preparation of medical records, embracing all steps necessary to the admission and discharge of patients from hospital, hospital tickets, case papers, reports of medical survey, etc.; also observing carefully the therapeutical indications in each case, general pharmacy, triturates, post-mortem examinations and reports, meteorological observations and reports.

IV. He will assign assistant surgeons to the Naval Medical Examining Board for careful and thorough instruction in the following branches :

HYGIENE AND SANITARY SCIENCE.

Embracing the general principles of hygiene, causes of disease, methods of investigation and prevention, vital statistics, first aid to the injured, blood circulation, muscles, exercise, nervous system, contagious diseases, digestion, respiration, organization and duties of health authorities, sanitary jurisprudence.

Water Supply.—Rainfall, flow of streams, storage of water ; quantity required for cities and towns, asylums, hospitals, etc.; impurities of water, their origin and nature, whether occurring at its source, in storage, or in distribution, and methods of purification by screens, filter beds, infiltration galleries, chemical processes, etc.; analysis, microscopical and chemical.

Air.—Composition, its impurities, effect of these on the sanitary condition of cities and towns, hospitals, asylums, public and private dwellings.

Soil.—Methods of studying the topographical and geological features of a district in reference to the effect of the quality and characteristics of the soil upon drainage and other sanitary conditions ; the location of cemeteries, etc.

House Drainage.—Water supply and drainage of naval hospital buildings and private dwellings, the removal of laundry, sink, and closet refuse ; practical elements of plumbing.

Sewage.—Removal and disposal by various methods, including the frequent and systematic removal from cesspools and privies, accompanied by disinfection and deodorization, by the water carriage system, pneumatic system, etc., to points of its final disposition ; the construction of sewers, including combined and separate systems, outfalls, sea outfalls, tank sewers, ventilation of sewers, etc.; final disposition of sewage, garbage, and other refuse by cremation furnaces, irrigation, filtration, chemical precipitation.

Ventilation.—Quantity of air required under various conditions ; method of supplying or renewing air by natural or spontaneous means, by artificial means.

Heating.—The various means of heating, by stoves, hot-air

furnaces, hot water and steam, and the most practical and efficient treatment of problems arising under various circumstances connected with public and private buildings ; the construction of apparatus and the distribution of heat, whether in connection with or independent of the ventilation ; the principles of heat and thermo-dynamics, applicable to all constructions connected with heating and ventilation, including boilers, radiators, flow of air through conductors, etc.

Inspections.—Methods of examination of sanitary conditions of public buildings and dwellings at navy yards and stations, and of sewers, drains, and water courses ; methods of disposal of sewage and garbage.

Drainage.—The drainage of districts for sanitary objects, surface and subsoil drainage ; drainage of sites for hospitals, dwellings, barns, and outhouses.

Sanitation of Government Reservations.—The construction, care, and management of cesspools, privies, etc., and their disposition with regard to wells and dwellings, care of gardens and yards, with reference to the accumulation and removal of refuse ; system of drainage at Navy Yard and Naval Hospital grounds, New York.

Pollution of Streams.—Remedies to be adopted and means of prevention.

Quarantine and Sanitary Regulations.—International, national, State, and interstate quarantine laws ; the various measures to be instituted before the departure of vessels from foreign and infected ports ; thorough inspection of every part of ship by medical officer assigned to this duty ; medical examination of passengers and crew.

Sanitary Precautions at Sea.—Arrangements and facilities for disinfecting and fumigating ships.

Sanitary precautions to be observed on arriving in port.

Location, character, and construction of quarantine hospitals.

Quarantine regulations with reference to disposal, fumigation, and disinfection of merchandise.

Sanitary administration.

MILITARY SURGERY AND OPERATIVE WORK.

Duties of the naval surgeon in relation to care of surgical instruments ; carriage of sick and wounded on shore, afloat, em-

barking and disembarking, including extemporary transport; preparation for service on board and on shore before action; instruments and supplies in action, and duties afloat and in the various lines of surgical assistance; establishment of field, temporary, and permanent hospitals and lines of assistance; hospital attendants; diagnosis, prognosis, and treatment in full of all injuries in battle, including full instruction in abdominal surgery for wounds; the trephine, amputation, resection, and other operations, and the use of extemporary appliances; preparation and record of statistics relative to the systematic arrangement and classification of the wounded. Construction and study of ambulances of modern design.

CONSTRUCTION AND VENTILATION OF MODERN SHIPS OF WAR.

Study of sectional plans of modern vessels of war, showing system of ventilation, heating, lighting, sanitary fittings, arrangement of quarters, manner of berthing officers and men, air space, location of sick bays, dispensaries, store-rooms, lavatories, bath-rooms, etc.

List of ships of the Navy, displacement, type, station or condition.

Personal visits of inspection to all ships at Navy Yard, including Receiving Ship, vessels in commission, ships of war undergoing construction and nearing completion.

EXAMINATION OF RECRUITS AND LIFE-SAVING METHODS.

Will include general inspection of surface of recruit, extremities and articulations, thorax, abdomen, groin and genitals, spine and perineum, head, face and neck, cranium and organs of special sense, intelligence and age.

In the preparation of "List of persons examined" (Form X.), the directions embodied in Book of Instructions will be strictly followed.

Rules for restoring the apparently drowned, how to arouse the patient; to expel water, etc., from the stomach and chest; to produce breathing; after treatment (externally and internally); evidences of vitality, etc.

V. He will assign assistant surgeons to the Naval Laboratory for instruction in the following practical work:

CHEMISTRY: GENERAL, ANALYTICAL, AND ORGANIC.

Inorganic chemistry; also chemistry of air, water, artificial illumination, photography, lime, mortars and cements, building stones, decay and prevention, timber and its preservation, pigments, paints, essential oils, varnishes, explosives, gunpowder, gun-cotton, and nitro-glycerine. Disinfectants for hospital and ship use. Metric system of weights, qualitative, quantitative, and blow-pipe analysis; organic chemistry, general principles and methods of analysis.

Analytical: Qualitative.—Having acquired a thorough experimental knowledge of the reactions of a group of bases or acids, single members of the group or mixtures must be submitted to him for identification, enabling him to proceed from simple to complex cases, until he is able to determine the composition of the most difficult mixtures.

Quantitative.—1. To analyze substances of known composition, such as crystallized salts, that the accuracy of his work may be tested by a comparison of his results with the true percentages.

2. Required to make analyses of materials occurring in commerce or in the applications of technical and sanitary chemistry, etc., as fertilizers, fuel, water, etc. The object being to instruct in analytical methods.

Organic.—The laboratory work to consist of: Ultimate analyses, including determination of carbon, hydrogen, nitrogen, sulphur, and haloid elements in organic substances; determination of vapor densities, molecular weights, specific gravities, melting and boiling points, and calculations of formulæ.

Analysis must be made on material supplied or authorized beforehand by the instructor at the laboratory, and he will require of the student, whenever practicable, reports in writing on completion of the work.

MICROSCOPY AND MICROBIOLOGY.

Practical acquaintance with the handling of the microscope, its construction, use, care, and choice; simple lens, optical principle, construction and use; compound lens, low-power objectives, use and care; accessory apparatus, general method of work, illumination, effect of different media; the eyes,

peculiarities, use, and protection ; mounting, dry, in liquid, and in cells ; section cutting, soft and hard tissues, crystals, rock sections and grains ; staining ; high power objectives, use and care, cover connections, and immersion fluids ; adulteration of foods, drugs, etc., detection of fibres, paper, and handwriting.

Microbiology.—Laboratory examination of unicellular forms of life, yeasts, protococcus, amœba, the moulds, algæ, and fungi of fresh waters ; fauna of potable waters.

General Bacteriology.—Isolation, preparation of culture media, mounting and study and identification of species, bacteria of potable waters, sewage bacteria, typhoid bacillus, biological examination of Croton water, Brooklyn aqueduct water, etc., bacteria of the atmosphere, biological analysis of air of hospital wards, class-rooms, etc., disinfectants and filters, becteriological tests.

VI. Application, whenever necessary, will be made to the commandant of the Naval Station, New York, for authority for the medical officer assigned to the duty, in company with the assistant surgeons undergoing instruction, to visit Receiving Ship, and all modern ships in commission, ships undergoing construction and nearing completion, that may be at the Navy Yard, for the purpose of inspection of every part of the vessel, and gaining information relating to general arrangement of sick and other quarters, system of ventilation and heating, air-space, etc.

VII. When assistant surgeons are assigned for instruction in specified branches, to Hospital, Examining Board, or Laboratory, the senior officers thereof shall appoint, as they may deem advisable, the medical officers under them as instructors in the special work, assigning to each such subjects as may be agreed upon, by consultation, care being taken that the system of instruction will necessitate everything in writing.

The student must carefully prepare all reports on the subjects assigned to him before presenting them to the instructor for inspection and remarks.

When papers are completed they shall be delivered by the instructor to the senior officer of the Hospital, Examining Board, or Laboratory, as the case may be, who will retain them until all papers prepared by the student during his term

of instruction are received, when they shall be forwarded to Director of Naval Laboratory and Department of Instruction, in accordance with prescribed form.

VIII. Medical officers, when assigned as instructors, whether attached to Laboratory, Hospital, or Examining Board, shall keep an accurate record in book form of all work required of assistant surgeons undergoing instruction. These record books, when completed, shall be delivered to the Director of the Naval Laboratory and Department of Instruction, to be placed on file. They will also see that assistant surgeons are provided with everything necessary to prosecute their work in an intelligent manner; use of apparatus for qualitative, quantitative, and organic analysis, for microscopy, and for bacteriology and chemical reagents for practical work in laboratory or elsewhere, use of surgical instruments and appliances for hospital work, free access to library, and use of modern text-books on every subject taught.

IX. Assistant surgeons will be held responsible for the proper care and safe return of instruments, books, microscopes, apparatus of all kinds, etc., placed in their charge during course of instruction.

X. When the professional record of an assistant surgeon is completed, and all papers prepared by him on subjects assigned, at Hospital, Examining Board, and Laboratory, have been received by the director in charge of Laboratory and Department of Instruction, he shall see that they are properly compiled and transmitted to the Bureau of Medicine and Surgery, in accordance with prescribed form.

XI. The assistant surgeon's professional record will be kept on file in the Bureau of Medicine and Surgery, until he becomes eligible for examination for promotion, when it will be transmitted to the Naval Medical Examining Board for inspection, to be returned to the Bureau on completion of his examination. This record, together with examination papers of both first and second examination, will then be bound in book form and kept for future reference, as a guide in assignment to duty, according to professional and other qualifications.

H. A. HERBERT,
Secretary of the Navy.

MORTALITY AND MORBILITY STATISTICS.

By Harry Kent Bell, M.D.

Alabama.—Jerome Cochrane, M.D., State Health Officer, Montgomery.

Mobile, 31,076: T. S. Scales, M.D., Health Officer, reports for the year 1892 a total mortality of 885, of which 231 were under five years of age, and 467 of colored persons.

There were 150 deaths from zymotic diseases, and 111 from consumption.

The death-rate was 28.43 per 1000.

In the month of June there was a mortality of 74, of which 53 were colored, and 22 were under five years of age. The annual death-rate per 1000 was 28.56.

Zymotic diseases caused 18 deaths, and consumption, 8.

Arkansas.—D. W. Holman, Secretary, Little Rock.

California.—J. R. Laine, M.D., Secretary, Sacramento.

Connecticut.—Professor C. A. Lindsley, M.D., Secretary, New Haven, sums up as follows:

The mortality report for June has been received from all the towns, representing a population of 797,995.

There were 982 deaths reported in the State during the month. This was 242 less than in May; it was 90 more than in June, 1892, and 78 more than the average number of deaths in June for the five years preceding the present.

The death-rate was 15.6 for the large towns; for the small towns, 12.7, and 14.0 for the whole State.

The deaths from zymotic diseases were 162, being 16.5 per cent of the total mortality.

The deaths from consumption numbered 105.

New Haven, 95,000: Total mortality, 140. Annual death-rate per 1000, 18.4.

Hartford, 58,600 : Total mortality, 96. Annual death-rate per 1000, 18.0.

Bridgeport, 55,000 : Total mortality, 85. Annual death-rate per 1000, 16.8.

Waterbury, 34,000 : Total mortality, 40. Annual death-rate per 1000, 12.4.

DELAWARE.—E. B. Frazer, Secretary, Wilmington.

DISTRICT OF COLUMBIA, 250,000 : C. M. Hammett, M.D., Health Officer, reports for the five weeks ending July 29th a mortality of 703, of which number 362 were of colored people, and 370 were under five years of age. The annual death-rate was 26.1 per 1000. There were 250 deaths from zymotic diseases, and 58 from consumption.

FLORIDA.—Joseph Y. Porter, M.D., Secretary, Jacksonville.

The summary, as published in *Florida Health Notes* for the month of May, is as follows :

Number of counties reporting, 21 ; number of cities reporting, 3 ; total population of said counties and cities, 225,736 ; number of births reported, 226 ; number of marriages reported, 219 ; number of deaths reported, 243 ; birth-rate per 1000 per annum, 12.02 ; death-rate per 1000 per annum, 12.92 ; average age of decedents, 21.97 ; number of deaths under five years of age, 110. The new rules and regulations of the State Board of Health went into effect on August 1st ; copies can be obtained by applying to the office of the Board at Jacksonville.

ILLINOIS.—J. W. Scott, Secretary, Springfield.

Chicago, 1,575,000 : A. R. Raynolds, M.D., Commissioner, reports 1942 deaths during June, representing an annual death-rate of 14.79 per 1000.

The mortality under the age of five years was 766. The deaths from zymotic diseases numbered 366, and from consumption, 193.

INDIANA.—C. N. Metcalf, M.D., Secretary, Indianapolis.

IOWA.—J. F. Kennedy, M.D., Secretary, Des Moines, reports in the *Monthly Bulletin* for the month of May :

Council Bluffs, 35,000 : total deaths, 19. Annual death-rate, 6.12 per 1000.

Des Moines, 70,000 : Total deaths, 30. Annual death-rate, 4.8 per 1000.

Davenport, 35,500 : Total deaths, 33, of which 9 were from accidents. Annual death-rate, 11.04 per 1000.

Dubuque, 40,000 : Total deaths, 29. Annual death-rate, 8.4 per 1000.

KANSAS.—M. O'Brien, M.D., Secretary, Topeka.

KENTUCKY.—J. N. McCormack, M.D., Secretary, Bowling Green.

LOUISIANA.—L. F. Salomon, M.D., Secretary, New Orleans.

New Orleans, 254,000 — 184,500 white, 69,500 colored. There were reported for four weeks ending July 15th, 543 deaths, of which number 217 were among the colored people, and 184 of children under five years of age. There were 97 deaths due to zymotic diseases, and 62 to consumption. The annual death-rate was 27.88 per 1000.

MAINE.—A. G. Young, M.D., Secretary, Augusta.

MARYLAND.—James A. Steuart, M.D., Secretary, Baltimore.

MASSACHUSETTS.—S. W. Abbott, M.D., Secretary, Boston.

Boston, 469,647 : S. H. Durgin, M.D., Chairman.

There were 772 deaths reported in June, of which number 223 were under five years of age. The annual death-rate per 1000 was 21.05. There were 107 deaths from zymotic diseases, and 99 from consumption.

MICHIGAN.—Henry B. Baker, M.D., Secretary, Lansing.

For the month of July, 1893, compared with the preceding month, the reports indicate that cholera morbus, diarrhœa,

and dysentery increased, and that influenza decreased in prevalence.

Compared with the preceding month, the prevailing direction of the wind was the same (southwest), the velocity was greater, the temperature was higher, the rainfall at Lansing was 6.21 inches less, the absolute humidity was more, the relative humidity was less, the day and the night ozone were much less, and the height of ground above the water in the well at Lansing was one inch more.

Compared with the average for the month of July in the seven years 1886–92, intermittent-fever, dysentery, cholera morbus, cholera infantum, remittent-fever, consumption, whooping-cough, and erysipelas were less prevalent, and no disease was more prevalent in July, 1893.

For the month of July, 1893, compared with the average for corresponding months in the seven years 1886–92, the prevailing direction of the wind was the same (southwest), the velocity was greater, the temperature was higher, the rainfall at Lansing was .92 of an inch less, the absolute and the relative humidity were more, the day and the night ozone were much less, and the height of ground above the water in the well at Lansing was seven inches less.

Including reports by regular observers and others, diphtheria was reported present in the month of July, 1893, at sixty-nine places ; scarlet-fever, seventy-three ; typhoid-fever, thirty-four ; and measles at forty-four places.

Reports from all sources show diphtheria reported at eleven places less, scarlet-fever one place less, typhoid-fever one place more, and measles at eleven places less than in the preceding month.

MINNESOTA.—C. N. Hewitt, M.D., Secretary, Red Wing.

St. Paul, 155,000 : H. F. Hoyt, M.D., Commissioner, reports for the month of June a total mortality of 103, of which 46 were under five years of age. The death-rate per 1000 was 7.91. The number of deaths from zymotic diseases was 20 ; from consumption, 5.

Minneapolis, 209,000 : E. S. Kelley, M.D., Commissioner.

During the month of June, 1893, there were 166 deaths, representing an annual death-rate of 10.17 per 1000. Zymotic

diseases caused 24 deaths, and consumption, 12. There were 66 deaths under five years of age.

MISSISSIPPI.—Wirt Johnson, M.D., Secretary, Jackson.

MISSOURI.—R. C. Atkinson, M.D., Secretary, St. Louis.

Kansas City, 132,716 : E. R. Lewis, M.D., Sanitary Superintendent, reports for June a mortality numbering 132, of which 57 were under five years of age, and representing an annual death-rate of 10.56 per 1000. Zymotic diseases caused 26 deaths, and consumption, 10.

St. Louis, 520,000 : G. Homan, M.D., Commissioner, reports for June 741 deaths, of which number 347 were under five years of age. The annual death-rate was 17.01 per 1000. There were 157 deaths from zymotic diseases, and 58 from consumption.

NEBRASKA.—F. D. Haldeman, M.D., Secretary, Ord.

NEW HAMPSHIRE.—Irving A. Watson, M.D., Secretary, Concord.

NEW JERSEY.—Ezra M. Hunt, M.D., Secretary, Trenton.

Hudson County, 301,298 : C. J. Rooney, Clerk, reports for June 482 deaths, of which 227 were under five years of age. Annual death-rate, 22.8 per 1000.

From zymotic diseases there were 91 deaths, and from consumption, 39.

Paterson, 90,251 : J. L. Leal, M.D., reports for June 140 deaths, of which number 61 were under five years of age. The annual death-rate was 26.3. There were 25 deaths from zymotic diseases, and 18 from consumption.

NEW YORK.—Lewis Balch, M.D., Secretary, Albany, reports in the *Monthly Bulletin* for June as follows :

June and November are the two healthiest months in this State ; there was an average daily mortality this month of 291, which is the lowest for two years, excepting last November. The epidemic of *grippe*, which began in March, has practically come to an end in its active prevalence, although

deaths continue to be reported as due to its effect, and will be for some time yet; the present epidemic is estimated to have caused 4300 deaths, and is the mildest of the series occurring during the past three and one half years. The death-rate in 145 cities and large towns, representing a population of 4,765,000, was 18.50, and of the entire State, allowing for returns yet to come in, about 17.50. Of zymotic diseases, the only one showing an increase in mortality is diarrhœa, but the customary rise in the number of deaths from diarrhœal diseases in June is less than usual by one third. Whooping-cough, which has been prevalent, especially in the maritime district, is decreasing. Diphtheria has diminished in mortality, as is customary. Scarlet-fever is less prevalent than a year ago. Small-pox has developed in Yonkers, 15 cases being reported, and in Sing Sing, 9 cases reported; the 10 deaths all occurred in the maritime district. Acute respiratory diseases caused little more than half the mortality of May, and all local diseases have a largely diminished mortality. The diminution in mortality, from all causes, is distributed through all parts of the State, but most markedly in the eastern and northern districts, where the death-rate is less than it was a year ago. During the six months of the year there have been 63,154 deaths, making a death-rate of about 21.30 per 1000 population annually. The weather during the month was generally fair—equable. The mean average barometer was 30.00, with but little variation; the rainfall was 2.05 inches, which is 3 inches less than in May and 1.45 inches less than the normal. The average thermometer was 69°, with little variation throughout the State, and was 3° above the normal.

New York, 1,860,803: Total deaths, 3348—1410 under five years. Death-rate, 21.87. Zymotic diseases per 1000 deaths from all causes, 205.78. Deaths from consumption, 394. There were 5 cases of typhus-fever in the Riverside Hospital July 1st, since which time, to July 29th, there have been admitted 8 cases. Of this number 6 have died and 7 have been discharged.

Brooklyn, 978,394: Total deaths, 1476—595 under five years. Death-rate, 18.35. Zymotic diseases per 1000 deaths from all causes, 162.00. Deaths from consumption, 176.

Syracuse, 91,944: Total deaths, 126—30 under five years.

Death-rate, 16.44. Zymotic diseases per 1000 deaths from all causes, 182.54. From consumption, 25.

Albany, 98,000 : Total deaths, 149—37 under five years. Death-rate, 18.18. Zymotic diseases per 1000 deaths from all causes, 120.80. From consumption, 21.

Buffalo, 290,000 : Total deaths, 372—144 under five years. Death-rate, 15.40. Zymotic diseases per 1000 deaths from all causes, 153.18. From consumption, 34.

Rochester, 144,834 : Total deaths, 195—39 under five years. Death-rate, 16.15. Zymotic diseases per 1000 deaths from all causes, 76. From consumption, 24.

NORTH CAROLINA.—Richard H. Lewis, M.D., Secretary, Raleigh.

NORTH DAKOTA.—F. H. DeVaux, M.D., Superintendent, Valley City.

OHIO.—C. O. Probst, M.D., Secretary, Columbus.

The *Monthly Sanitary Record* furnished the following report for the month of May : Ninety-four cities, towns, and villages, having an aggregate population of 1,343,939, returned 1808 deaths, of which number 464 were under five years of age. The annual death-rate was 15.41 per 1000. Zymotic diseases caused 301 deaths, and consumption, 230.

Cincinnati, 325,000 : J. W. Prendergast, M.D., Health Officer, reports for July 595 deaths, of which 277 were under five years of age. Annual death-rate per 1000, 21.97. There were 141 deaths from zymotic diseases, and 75 from consumption.

Mansfield, 15,000 : R. H. Reed, M.D., Health Officer, reports for July 11 deaths, of which 3 were under five years of age.

Consumption caused 1 death, and diphtheria, 1. The annual death-rate was 8.8 per 1000.

OKLAHOMA TERRITORY.—J. O. Overton, M.D., Secretary, Kingfisher.

PENNSYLVANIA.—Benjamin Lee, M.D., Secretary, Philadelphia.

Philadelphia, 1,115,562 : M. Veale, Health Officer, reports : In the five weeks ending July 29th, 1893, there were 2762 deaths, of which number 1460 were under five years of age. Annual death-rate, 25.8 per 1000. Deaths from consumption numbered 252, and from diarrhœal diseases, 729.

Pittsburg, 255,000 : J. Guy McCandless, M.D., Registrar, reports : During the five weeks ending July 29th, 1893, there were 751 deaths, of which 453 were under five years of age. Annual death-rate, 27.58 per 1000. Zymotic diseases caused 278 deaths, and consumption, 41.

Reading, 62,232 : M. A. Rhoads, M.D., President, reports for the year 1892, 984 deaths, of which number 339 were under five years of age. Death-rate, 15.08 per 1000. Deaths from zymotic diseases numbered 184 ; constitutional diseases, 145 (consumption, 35) ; local diseases, 522 ; developmental diseases, 87 ; by violence, 45.

RHODE ISLAND.—C. H. Fisher, M.D., Secretary, Providence.

SOUTH CAROLINA.—H. D. Frazer, M.D., Secretary, Charleston.

SOUTH DAKOTA.—C. B. Alford, M.D., President, Huron.

TENNESSEE.—J. Berrien Lindsley, M.D., Secretary, Nashville.

The principal diseases, named in the order of their greater prevalence, in the State for the month of June were : Malarial-fever, dysentery, diarrhœa, typhoid-fever, consumption, cholera morbus, cholera infantum, whooping-cough, diphtheria, and varicella.

Typhoid-fever was reported in the counties of Chester, Fayette, Giles, Hamilton, Humphreys, Knox, Madison, Moore, Rutherford, Shelby, and Williamson. Consumption in Anderson, Davidson, Hamilton, Hancock, Humphreys, Knox, Montgomery, Rutherford, and Shelby. Whooping-cough in Cheatham, Davidson, Houston, Moore, Rhea, and Shelby.

Varicella in Gibson, Hamilton, and Wilson. Measles in Humphreys and Robertson. Meningitis in Rutherford.

Chattanooga, 27,000 white and 13,000 colored : Total deaths, 46—28 of which were colored, and 26 under five years of age. Annual death-rates, 8.0 for the white population, and 25.84 for the colored, per 1000.

Knoxville, 31,273 white and 9112 colored : Total deaths, 75—23 of which were colored, and 33 under five years of age. Annual death-rates, 19.95 white, and 30.28 colored, per 1000.

Memphis, 33,800 white and 27,700 colored : Total deaths, 113—63 of which were colored, and 38 under five years of age. Annual death-rates, 17.74 white, and 27.30 colored, per 1000.

Nashville, 54,595 white, 33,159 colored : Total deaths, 141 —66 of which were colored, and 74 under five years of age. Annual death-rates, 16.47 white, and 23.88 colored, per 1000.

WASHINGTON.—G. S. Armstrong, M.D., Secretary, Olympia.

WEST VIRGINIA.—N. D. Baker, Secretary, Martinsburg.

WISCONSIN.—J. T. Reeve, M.D., Appleton.

Milwaukee, 250,000 : U. O. B. Wingate, M.D., Commissioner, reports for the month of June 296 deaths, of which 130 were under five years of age. Annual death-rate per 1000, 14.20. From zymotic diseases there were 87 deaths, and from consumption, 17.

PROVINCIAL BOARD OF HEALTH OF ONTARIO.—Peter H. Bryce, M.D., Secretary, Toronto.

PROVINCE OF QUEBEC.—Elzear Pelletier, M.D., Secretary, Montreal.

BUENOS AYRES, 554,713 : Albert B. Martinez, Director-General of Municipal Statistics.

MEDICAL EXCERPT.

By T. P. Corbally, A.M., M.D.

Tuberculosis Treated with Iodine.—Dr. Cadier and M. Joly, pharmacist, have sent a communication to the Société de Médecine et Chirurgie pratiques of Paris, giving the clinical results of experiments continued during a year with iodine united with substances forming unstable organic compounds, in connection with physiological phosphates used in the treatment of tuberculosis.

The results are most encouraging, and deserve the attention of practitioners. These experiments were made at the Hospital Villepinte.

The employment of iodine in cases of pulmonary phthisis is not new. In 1822 the tincture of iodine, in drop doses, was tried, but its use could not be continued for a sufficient length of time, on account of the irritation which it produced in the digestive organs, nor could it be employed in doses sufficiently large to produce a distinct or definite effect.

The present authors have directed their attention, in the first place, to find a compound with iodine which would preserve all the properties of free metallic iodine, without having its defects, iodoform, iodol, aristol, etc., not having given satisfactory results. They have found it in the extracts of certain plants, and the two forms under which they administer the iodine are in wine containing at the same time phosphoglycerate of potash, and in pills, each containing 4 milligrammes of phosphate of iron. They begin by giving 5 centigrammes of iodine during the first week, and increasing by the same quantity each week, until they give 40 centigrammes a day.

The difficulties met with in the administration of iodine being removed, the following are the properties that recommend the use of this metal. Iodine is powerfully antiseptic, the proportion being 1 to 4000, and it is extremely diffusible; and while it destroys the microbes it at the same time neutralizes the alkaloids and the toxines which they secrete by form-

ing with them insoluble precipitates. By this depurative action, united with its energetic stimulating properties in union with the phosphates, iodine assists in the reconstruction of the cellular elements and in the restoration of the vital energy. This medication, then, fulfils the double purpose of killing the microbes or of neutralizing their effects, by surrounding them with an aseptic envelope in cases in which they are located in impermeable locations, and by restoring the vitality of the debilitated system.

The experiments conducted during a whole year without interruption have demonstrated the perfect safety of the treatment. And the belief that iodine causes wasting of the flesh is removed ; almost all the patients have very nearly regained the weight which they had lost. The previous weight was remarkably increased in persons who had not completed their growth.

One of the first effects observed in all the patients treated with iodine was its general stimulating effects. Under its influence a congestive action was set up in the lungs and the larynx, the cough became more frequent, the expectoration more abundant, the harshness and resonance of the voice became somewhat more marked, accompanied with a little fever during certain parts of the day. This congestive period lasted from six to twelve days, and from that time forward the patients felt a degree of comfort and vigor which remained without interruption.

The authors have formed the following conclusions from their investigations : Now it is hardly possible, after the closest and most searching examination of the larynx and the chest, to find even a slight trace of the primitive lesion.

We have, as is generally admitted, in iodine a specific for scrofula, which is in many cases the first indication or the early stage of tuberculosis ; the same remedy might be, under certain circumstances, a preventive or real cure for the terrible disease, the course of which, at least up to the present, we could do no more than retard the development of by means of creosote and the use of cod-liver oil. It is certain, however, that the results obtained previously by the employment of small doses of iodine strengthen very materially the conclusions which we have pointed out above.

SYNCOPE FROM CHLOROFORM INHALATION.—M. A. Guérin brought the subject before the meeting of the Academy of Medicine on July 11th ult. (*Progres Méd.*). He recognized the fact long ago that the inhalation of chloroform through the nose was much more dangerous than inhalation through the mouth. The irritation of the pituitary, at the beginning of the anæsthesia, by reflex action, may cause fatal syncope. At his request M. Laborde demonstrated this fact by a practical experiment which was entirely satisfactory to all present.

M. Laborde presented a rabbit on which tracheotomy had been performed, and on the thorax he applied an instrument to mark the beats of the heart.

If the chloroform was applied through the canula in the trachea, the beats of the heart were not changed, but they became feeble, slow, and irregular when the inhalation was made through the nose. When the anæsthesia has become deep and nearly complete, the reflex action on the heart is much less marked than in the beginning.

M. Le Fort observed many years ago an unfortunate clinical case fully demonstrating the influence of reflex action in causing death by chloroform. A child, ten years old, on whom an operation was to be performed, was breathing very slowly and imperfectly. He was told to breathe deeper and fuller. Instead of a strong and deep inspiration, he made a long and forcible snuffing of the chloroform. He immediately fell lifeless. No efforts could save him; breathing from mouth to mouth, artificial respiration used in various ways, and even tracheotomy was insufficient to restore life. It was a real case of death from heart failure. The disturbance arising from reflex nasal action is especially dangerous in the early stages of the administration of chloroform.

M. Le Fort referred to the fact that, in the early days of the administration of ether, for the purpose of producing anæsthesia, the physician was accustomed to use a special clamp with which to close the nasal passages. Many surgeons at the present day who employ chloroform as an anæsthetic take care to compress the nose with such an instrument when they begin the administration.

Very few physicians or surgeons now use chloroform as an anæsthetic in general practice, ether being considered much

safer. The opinion is equally prevalent that chloroform is not dangerous in obstetric practice ; it is the anæsthetic always used in difficult labor or when instruments are applied, the use of ether being almost unknown in such cases. Is there anything in the puerperal condition to protect the patient from asphyxia in such cases? Is the nervous condition so altered that the reflex action is not exerted on the heart? or is the immunity due to the manner in which the chloroform is applied, a towel or a handkerchief being generally used instead of a cone, thus leaving the nose free to inhale the air, while the chloroform passes through the mouth?

EUROPHEN IN RHINOLOGY.—Dr. Lieven has made many interesting experiments with europhen, and finds it a powerful antiseptic. It diminishes excessive nasal secretions, and restores a healthy secretion in cases of dry catarrh (*Deutsche Medicinal Wochenschrift*).

Its efficiency as an antiseptic was proved by sprinkling a culture of blood from the liver of an animal with europhen, which entirely prevented the development of bacilli. The author has used the agent many times after operations in the nasal passages for the purpose of rendering the discharges aseptic. In these cases there was no offensive odor, and in one case, through forgetfulness, the tampon conveying the europhen was left in the nose for five days. Besides, with the use of the remedy there is no elevation of temperature, as happens sometimes after operations in the nasal cavities, nor do patients complain of headache and general malaise, which follow the absorption of the decomposing secretions.

As an absorbent, europhen has been used in the hypersecretion of cases of rhinitis in children, by causing them to snuff the undiluted powder after previously washing the nose with a solution of sublimate 1 to 1000.

But in eczema of the anterior part of the nasal cavity and of the upper lip, precipitate ointment, diluted, has acted better than europhen, which seemed in some cases to bring out an eczematous eruption.

The tonic effect of europhen in the form of an ointment has proved very useful in dry catarrh of the nose, and in simple atrophic rhinitis it was used in ten cases, and the tampons,

which were left in the cavities twenty-five minutes, very quickly produced a sensation of moisture and of great comfort. The treatment in these cases was continued for fourteen consecutive days, and after that time was limited to two applications a week; and the patients after treatment ceased continued the application on account of the feeling of relief and the agreeable sensation which it produced. In three cases of ozæna the relief was immediate, but after treatment, which lasted a short time, the disease returned.

M. Lieven employed europhen in three cases of chronic otorrhœa with great advantage. It is necessary to cleanse the meatus with tepid water and dry it, and then a 10 per cent solution of europhen is poured in and allowed to remain two or three minutes.

SCARLATINIFORM DERMATITIS was the subject of a paper by M. Juhel Renay, presented to the Academy of Medicine by M. Brucq (*La France Médicale*, July, 1893), which gave the history of a woman who was attacked on December 12th, 1892, with a general eruption resembling scarlatina; the face presented an erysipelatous appearance, and was deeply furrowed. On the body there was, early in the history of the case, an abundant desquamation, but there was none in the groins; the tongue was glossy in appearance, and the temperature rose, sometimes to 38° and 40° Centigrade. Vaseline was freely applied, and the whole body was enveloped in wadding. At the end of fifteen days there was great improvement, but ten days later a fresh eruption broke out. The body was again enveloped in wadding, and a cure resulted. The patient was on the point of leaving the hospital when the same conditions reappeared. She soon fell into a state of coma, and died in forty-eight hours from the last attack. She was in the fourth month of pregnancy. At the autopsy nothing unusual was found except a very large spleen.

M. Besnier asked if there were not in this case an unusually large quantity of urea passed.

M. Fournier inquired if the patient had taken mercury. There is a great resemblance, he said, between scarlatiniform, erythema and mercurial eruptions.

The following report of a case treated in St. Peter's Hos-

pital, Brooklyn, has been prepared by my assistant, Dr. F. J. Magilligan, because in some respects it bears a striking resemblance to the case of Dr. Brucq.

A. B., aged 52 years, has had rheumatism several times, and had syphilis about five years ago.

He was taken sick on June 27 with pains in his back and limbs and a severe attack of gastro-enteritis. The following day the right foot commenced to swell, and became exceedingly painful. On July 2d a few red spots appeared on his chest, and, spreading rapidly, he was soon covered from head to foot with an extensive dermatitis. At the same time his throat became sore, and his tongue began to assume the appearance of a typical strawberry tongue. During all this time the gastro-enteritis continued, and after the second day showed decided periodicity. The vomiting occurred every three hours, and the bowels moved a few minutes after. The discharges in both cases were greenish and watery. About July 10th the dermatitis began to disappear ; profuse cold perspiration set in, and in a few days desquamation began and continued for seven or eight days, during which time the gastro-enteritis ceased. The sweating and also the pain in the left foot disappeared, and a tardy convalescence began, and the patient, although much better, is not yet—August 10th—discharged from the hospital.

The temperature was never above 99.5° and not below 98.5°.

The treatment consisted principally in external applications, and when the bowels could not be checked, food and medicines were given per rectum.

The medicines employed were mainly the salicylates and the iodides in large doses. With the aid of other tonics convalescence was established.

Hypertrophic Acne of the Nose was the subject of a report (*La France Médicale*) at a recent meeting of the Academie de Médicine by M. Felizet for Dr. Dély. The report clearly showed the uselessness of half-way measures in the treatment. He removed all the diseased parts as he would for a malignant tumor. The quantity removed would fill a flask holding 200 grammes or a little more than six ounces.

He secured complete recovery by the French method of laying grafts on the cartilaginous frame of the nose, and he took special care to preserve the borders of the nostrils. The result was very satisfactory.

M. Berger.—It is difficult to discuss a case of this kind when the patient is not present, but the photograph presented by M. Dély gives us a very good idea of the rhinophyma or hypertrophic acne. I have operated on ten cases similar to this. Many years ago M. Le Dentu read a paper giving an account of several cases in which he employed a more simple treatment than that of M. Dély. It is to him that I have always had recourse in such cases. After having removed the tumor completely, M. Le Dentu does not employ grafting to effect a complete cure.

The part to be removed is carefully circumscribed with an incision, and then with the finger or forceps and the aid of a bistoury the diseased portions of the nose to be removed are separated from the osteo-cartilaginous frame, the solid parts serving as a guide. Nothing should be left but the cartilage and the bones. The cure is effected without leaving a trace of cicatricial retraction.

However deeply the flesh may be removed, there is always left glandular culs-de-sac. These give rise to an epithelial proliferation on which, at the end of five or six days, may be seen little patches of epidermis springing up. At the end of two weeks at furthest, the patients are cured and the cicatrices are all healed.

The nose preserves its natural form after this operation; sometimes there may be a very slight contraction of the nostrils. The result, so far as regards the shape of the nose, has always been good.

M. Lucas Championnière.—The name of Ollier should always be mentioned in connection with this subject. His operation is still more simple. He removes all the diseased parts by means of thermo-cautery, and does not use any other remedy to complete the recovery. By using thermo-cautery all danger of hæmorrhage is avoided, and, as is generally the case, if any small points of acne should exist on the face they can be destroyed immediately by touching them with a thermo-cautery needle.

M. Routier.—M. Le Dentu has himself taught me the method spoken of by M. Berger.

M. Verneuil.—When an operation is performed on a sudoriparous epithelioma, situated about the nose, whatever may be the extent of the base of the tumor, there is no necessity for aiding the process of reparation. The thermo or galvano cautery prevents hæmorrhage and leaves a cicatrix less livid than that caused by the knife. The autoplastic grafts give results much less satisfactory than those obtained by spontaneous cicatrization.

MICRO-ORGANISMS IN THE MILK OF HEALTHY LYING-IN WOMEN.—Palleske (*Virchow's Archiv.*) concludes, as the result of a series of researches, that micro-organisms are to be found in the milk of many healthy women—possibly fifty per cent. These germs belong to the cocci, and solely, as far as Palleske has himself determined, to the variety known as staphylococcus pyogenes albus. It is doubted whether the germ reaches the mammary gland through the blood current, or enters the ducts from without. It is certain that the staphylococcus may actually abound in milk fresh from the mammary gland without the simultaneous or consequent occurrence of inflamed breast or general symptoms of fever.

BILLS OF PARTICULARS are sometimes called for of doctors as well as of other people. The following, by a Devonshire rural shoemaker, clipped from the Paris edition of the New York *Herald*, is a suggestive example :

" Squire D. W. to Mr. J. Watton. Clogged up Miss Susy, 10*d.* ; mended up Miss, 2*d.* ; tapt Measter, 8*d.* ; heel tapt and bound up Madem, 11*d.* ; turned, cloged and mended the Maid, 1*s.* ; heel tapt Measter, 8*d.* ; lined round and put a piece upon Madem, 4*s.* 3*d.* ; stitched up Miss Kitty, 3*d.* ; souling the Maid, 8*d.* ; taping Madem twice, 8*d.* ; putting a piece upon Measter, 2*d.*—10*s.* 3*d.*"

EDITOR'S TABLE.

SANITARIAN, SEPTEMBER NUMBER, 1893.

☞ ALL correspondence and exchanges and all publications for review should be addressed to the Editor, DR. A. N. BELL, Brooklyn, N. Y.

CHOLERA AT THE PORT OF NEW YORK, during the last two weeks, has served to confirm and increase the confidence which THE SANITARIAN expressed more than a year ago in Health Officer Jenkins's ability to restrict it.—Meanwhile the Board of Health and other city officials are intently engaged upon an effort to destroy the evidence of their senses and the rendering of the nitrifying bacteria, regardless of the continued pollution of the Croton Lake.

August 12th Dr. Cyrus Edson, Medical Commissioner, sent to Mayor Gilroy the results of three analyses made in the Health Department Laboratory by Chemist Martin of water taken from Croton Lake two days before, at the time they, with other officials, visited Croton Lake to test the water before and after it had been subjected to the new process of purification.

Of the three samples taken, one was from a point in the lake thirty feet above that at which the electrozone was deposited in the water. This was marked sample A. Samples B and C were taken respectively thirty and one thousand feet below the point treated.

Sample A showed a slight trace of nitrites. Samples B and C showed no traces of nitrites, and there was a marked improvement in the appearance and odor of the water.

"There were," Dr. Edson said, "about seventy-five million gallons of water being treated each day with good results. When the plants are in working order double the number of gallons will be purified. The water which now flows into the city is as pure as can be desired or science make it."

As well cease all efforts against conditions promotive of typhus-fever and rely upon curing those who may contract it, as to ignore the continued pollutions of the Croton Lake and rely upon purification of the water.

There is no evidence that nitrifying bacteria or the nitrites which they eliminate are in themselves dangerous to health,

even if swallowed. The *real danger* is that which they indicate, the *presence of putrefying organic matter.*—

Dr. Jenkins's latest bulletin, at the time of this writing, August 14th, to date :

" Two suspects were isolated at Hoffman Island early this morning, but, owing to the rough breakers in the lower bay, were not removed to Swinburne Island Hospital. If the wind moderates they will be transferred during the night. They are Maria Reno, four years old, and Pasquale De Padro, fifteen years old. The bacteriological examination shows that Giuseppi Adamo, who was removed yesterday, is suffering from cholera, and that Francisco Cowlo, Paola Mariani, and Georgio Canas had not developed the disease.

" The census of the hospital to-night shows : Cholera patients, 14 ; patients not having cholera, 3 ; convalescent, 1 ; suspects on Hoffman Island, 2 ; total, 20.

" All of the patients are improving. The disease is mild in character. Two more nurses were sent to Swinburne Island to-day. The steamer *Fulda* arrived to-day from Genoa. All were well on board. All of the steerage passengers had been detained five days at that port, and their baggage was disinfected before embarkation. The cabin passengers were examined and provided by me with passports on which was a written statement of their route of travel for ten days before sailing, in order that detention on the railroads may be avoided."

The *Fulda* was disinfected and allowed to proceed after the customary inspection of the steerage passengers.

" The Public Health, the welfare and safety of the community, are matters of paramount importance, to which all pursuits, occupations, and employments of individuals, inconsistent with their preservation, must yield." (Commonwealth *vs.* Upton, 6 Gray, 473, opinion by Merrick, J.)

But the public health cannot be protected by the execution of such orders as have recently emanated from the authorities of some cities roundabout, or in communication with Pensacola, because two cases of yellow-fever have recently occurred there, while they neglect unsanitary conditions among themselves.

IMMIGRATION SUPERVISION.—In view of the possible advent of cholera, the United States Marine Hospital Service has prepared a system of medical supervision of immigrants until they arrive at their proposed destinations. On each immigrant train that leaves the city there will be a medical representative of the Marine Hospital Service, whose duty it will be to report to Dr. Bellbache, of the Ellis Island immigrant depot, any cases of sickness occurring during the journey. In the event of cholera developing in transit, the patient will be isolated and the train quarantined.

THE INFLUENCE OF A LOW BIRTH-RATE on the death-rate is shown in the following extract from the journal of the Statistical Society of Paris, translated in the publications of the American Statistical Association :

The great weakness of France is the low birth-rate. This has fallen during this century from 32.2 per 1000, in 1801–10, to 24 in 1881–88, although the decrease has been less rapid since 1850. With a rate of 25 per 1000 in 1865–83, France stood last among European nations, the average of which was 38.5. Its marriage rate was more normal, as France stood eighteenth in a total of twenty-nine nations. Since 1886 the number of births has fallen below 900,000, and, owing to the epidemic of influenza in 1890, was even less than the number of deaths. This feeble birth-rate is largely responsible for the low death-rate, of course, and it is merely an exaggeration of a phenomena common to all the States of Europe. Since 1872 its population, considering the excess of births over deaths, has gained on the average but 3.4 per 1000 yearly, while that of Europe has grown at the rate of 11 per 1000, and the German Empire at a rate of 11.6 per 1000. The annual surplus for the last ten years has not been above 2.9 per 1000 as in 1881, and the average has been but 1.7, so that the least disturbance of normal conditions may change it into a deficit, as in 1890. Illegitimacy is not very great, being but 7.5 per 1000 births, though it has risen in single years to 8. This is rather from a decrease in legitimate births, however, than from increase in the absolute number of illegitimate ones.

LITERARY NOTICES AND NOTES.

EDUCATION IN THE UNITED STATES, as represented by the Report of the Commissioner for 1889-90, may be summed up as follows :

Total number of pupils enrolled in the schools of all grades, public and private, for the year ending June 30th, 1893, 14,512,778—an increase of 786,204, or 5.73 per cent, over the previous year. This number is exclusive of evening and many other kinds of schools of a special character, which, in the aggregate, would increase the total to about 14,800,000.

Ninety-six and one half per cent are reported as receiving elementary instruction only. One pupil in 40 was under secondary instruction ; 1 in 107 was under superior instruction—in colleges, universities, and equivalent grades of work arranged for pupils in their thirteenth to sixteenth years' work, and aged from nineteen to twenty-two years.

The school term varies in localities from 88.1 to 166.6 days, the average for the whole country being 134.3 days. Cities have an advantage in the length of the school term over the sparsely settled regions devoted to agriculture.

The actual average amount of schooling received by the entire population, measured by the present percentage of attendance and length of school term, is four years and three tenths. Of the several divisions of the country in this respect :

North Atlantic Division	5.89 years
South Atlantic Division	2.52 "
South Central Division	2.56 "
North Central Division	5.15 "
Western Division	4.40 "

There are four States that exceed six years to each inhabitant—namely :

Massachusetts, 6.86 years ; New York, 6.41 ; Connecticut, 6.40 ; Ohio, 6.20.

Not quite one eighth of the pupils are enrolled in private schools.

Remarking upon the shortness of the average time devoted to learning the branches taught in primary grades, occupying the first half of the course of study in elementary schools, as being but barely sufficient for learning how to read and write, and to use numbers in the simplest processes, the Commissioner finds consolation in the circumstance that, notwithstanding this deficiency, " when it is taken in connection with the almost universal circulation of the daily newspaper, the matter does not seem so desperate, for the newspaper serves as a sort of continuing school, and effects a slow and gradual progress among the people throughout life along the lines of literary growth."

In the South, notwithstanding the shortness of the school term in the agricultural sections, the proportion of the population actually brought into school for each shows great zeal in those communities. The Southern States on the Atlantic coast enroll a larger proportion of the population in school than the States north of them. The Gulf States enroll a still larger proportion ; but the Northern States of the Mississippi Valley and the lake regions surpass all other sections in the proportion enrolled in school.

Of colleges and universities, there are 415 from which reports have been received. The number is constantly increasing. The statistics are illustrated by graphic views showing the growth of co-education, the distribution of college students among the five geographical divisions of the country, the sources of income and the productive funds, and the benefactions received in the several divisions.

Professional education is elaborately exhibited, comprising ten years' summary of growth in the several institutions devoted to theology, law, medicine, and applied science in its several forms of engineering (civil, mechanical, and mining), architecture, agriculture, and university instruction in pedagogy. The interest and value of this summary is greatly enhanced by comparison with the courses of study in European institutions.

Special chapters on " Reformation of Juvenile Offenders," " Education of the Colored Race," and " Swedish Gymnastics," add to the value of a report which, taken altogether, is the most comprehensive and valuable that has ever emanated

from the Bureau. It is a misfortune to the educational interest of the country that it has taken the public printer *two years* to issue it.

A Chapter on Cholera for Lay Readers: History, Symptoms, Prevention, and Treatment of the Disease. By Walter Vought, Ph.B., M.D., Medical Director and Physician-in-Charge of the Fire Island Quarantine Station, Port of New York; Fellow of the New York Academy of Medicine, etc. Illustrated with colored plates and wood-engravings. 12mo, pp. 110. Price, 75 cents. Philadelphia: The F. A. Davis Co., Publishers, 1914–16 Cherry Street.

The title of this little volume is lacking, in that, after words "Lay Readers," should be added, and Inexperienced Physicians. Because besides being an admirable statement of the conditions and needful precautions to layment against cholera, it is one of the very best summaries of treatment, with which every physician should be acquainted, that has fallen under our notice. Dr. Vought has made excellent use of his opportunity in so promptly giving the public and the medical profession the benefit of his experience in dealing with the cholera last summer; and the publisher for so worthily presenting it, at a price which should place it in the hands of all who would take the most facile means of obtain ing necessary knowledge.

Bacterial Poisons. By Dr. N. Gamaleïa. Translated by E. P. Hurd, M.D., Member of Massachusetts Medical Society, and of the Climatological Society, etc. 12mo, pp. 150. Price, 25 cents. George S. Davis, Detroit, Mich.

This is a timely issue of a monthly volume of the "Physician's Leisure Library" series, which should find many readers. All physicians or others who would understand the true relation of bacteria to disease—who would distinguish between bacteria *per se* and the chemical poisons which they produce—the evolution of bacterial poison; all who would acquire a clear comprehension of the nature of microbial poisons, their modes of introduction in different diseases, and their destiny in the animal body, should procure this book.

SEWAGE PURIFICATION IN AMERICA. A description of the municipal sewage purification plants in the United States and Canada. New York: Engineering News Publishing Co.

This is a closely printed 12mo volume, with numerous diagrams and maps compiled and revised from descriptions published in the *Engineering News* during the past year. It comprises all of the town sewage purification plants known to be in operation or ready for operation on April 1st, 1893.

It opens with a description of the sewage purification plant at South Framingham, Mass., to prevent the pollution of the Boston water-supply, which is believed to be one of the most successful in the country, and to compare favorably with any existing elsewhere. Following this all the different plants are classified, according to the different systems, as follows: Intermitent Filtration, Broad Irrigation, Subsurface Disposal, Sedimentation, Mechanical Separation by Filtration, and Chemical Precipitation, and described severally, to which is added a chapter on "Sewage Purification and Storm and Ground Water."

The book contains a large amount of practical information of the utmost importance to the healthfulness of hundreds of unsewered towns throughout the United States, and we earnestly commend it to all health officers and town authorities as a fund of knowledge on the most important subject that should engage their attention.

SEWAGE DISPOSAL, Report of Sewer Commissioners of Canton, O., is a pamphlet of 100 pages, illustrated by numerous cuts and diagrams and a chart of the district sewered, of practical utility to the authorities of all towns situated, as Canton is, inland, with no outfall for sewage without danger to the water-courses. It comprises a concise description of the differential adaptations of the separate and combined systems of disposal by water carriage, chemical treatment and irrigation works, and the common defects of house drainage, with suggestions of practical remedies.

PROCEEDINGS OF THE UNITED STATES NAVAL INSTITUTE, Vol. XVIII., No. 3, 1892. A pamphlet of 100 pages, appropriately illustrated, comprising six lectures on "First Aid to

the Injured and Transportation of the Wounded," delivered to the naval cadets during the winter of 1892 by HENRY G. BEYER, M.D., Ph.D., M.R.C.S., P.A. Surgeon U. S. Navy.

Beginning with the fundamental principles of hygiene, the causation, means of preventing and stamping out infectious diseases, the lecturer proceeds with practical instruction on antisepsis and asepsis; so much of anatomy and physiology as is necessary to the easy detection of injuries and the ready adaptation of bandages; injuries of all sorts, hæmorrhage, and the use of ready remedies and methods of transportation of the sick and wounded, altogether a pamphlet of great practical utility, particularly commendable to ambulance surgeons and policemen.

STERILITY IN THE WOMAN AND ITS TREATMENT. By Dr. DE SINETY. Translated by E. P. Hurd, M.D. "Physician's Leisure Library" series. Price, 25 cents. George S. Davis, Detroit, Mich.

The author of this book is a well-known continental authority on obstetrics and the diseases of women, and the author of a popular text-book on gynæcology. In this is given the gist of his observations from a wide experience, beginning with the physiology of fecundation. This is followed by chapters on the causes of sterility, severally, and finally by a chapter on artificial fecundation.

THE JACKSON SANITORIUM, DANSVILLE, N. Y., is the subject of a beautifully gotten up pamphlet before us, descriptive of one of the most healthfully situated, best equipped, and best-conducted resorts for invalids in the country. The Sanitorium is situated among the hills of the beautiful Genessee Valley of Western New York, amid salubrious surroundings and charming scenery. Physicians who have patients requiring, or chronic invalids who themselves recognize the need of hygienic regimen intelligently administered, would find it difficult to procure equally favorable conditions elsewhere. If more is required, all the most improved forms of baths are provided, notably the Molière thermo-electric, Turkish, Russian, electro-thermal, and salt baths; also massage, Swedish movements, inunction, electricity, light gymnastics, vacuum

treatment, etc., as may be required. Drugs are not relied upon, and but rarely resorted to.

EAUX MINÉRALES NATURELLES, FRANÇAISES ET ÉTRANGÈRES. By Dr. PROSPER DE PIETRA SANTA. Paris: Félix Alcan, 108 Boulevard Saint-Germain.

A pamphlet of 90 pages, comprising a brief history of mineral waters and their therapeutical uses, an alphabetical catalogue of all the mineral springs of France, and the principal of other European countries up to October 1st, 1891, and a classification according to their chemical properties. It is a valuable contribution to the subject.

THE HEATING OF LARGE BUILDINGS. By ALFRED R. WOLFF, M.E. Price, 25 cents. New York: 907 Fulton Building.

A pamphlet of 16 pages, with diagrams describing the most essential conditions of healthful heating and ventilating of a class of buildings now in popular favor. It is worthy the attention of the many thousands who occupy such buildings, if they would avoid the dangers to health common to them, as they now too generally obtain.

PHYSICAL EDUCATION, edited by LUTHER GULICK, published monthly by The Triangle Publishing Co., Springfield, Mass., at $1 a year, is one of the most promising specialists in the field of sanitary science recently admitted to our exchange list. The latest number before us—that for August—contains an instructive paper by William A. Jackson, Jr., of New Brunswick, N. J., on "Graphic Methods in Anthropometry," and several shorter papers and clippings of interest to the cult, promotive of health and strength.

PHYSICAL CULTURE. An illustrated pamphlet-manual of home exercise, describing the most approved apparatus for home use. Peck & Snyder, Gymnasium Outfitters, 128 Nassau Street, New York.

COST OF MILK PRODUCTION—VARIATION IN INDIVIDUAL COWS. By HENRY H. WING;

ŒDEMA OF THE TOMATO. By GEORGE F. ATKINSON; and

DEHORNING. By L. P. ROBERTS.

Bulletins 52, 53, and 54. Cornell University Agricultural Experiment Station, Ithaca, N. Y., are instructive pamphlets, worthy of extensive circulation.

PROPER BREATHING MOVEMENTS A PREVENTIVE OF CONSUMPTION.—DR. THOMAS J. MAYS contributes an article to the August *Century* in which he thinks it is evident that proper development and expansion of the lungs by means of well-regulated breathing must be regarded as of the greatest value in the prevention and in the treatment of the inactive stages of pulmonary consumption. The more simple the method, the more effective and practical will be the results which flow from it. Among the many exercises which are recommended for this purpose, the following movements are very valuable. The arms, being used as levers, are swung backward as far as possible on a level with the shoulders during each inspiration, and brought together in front on the same level during each expiration. Or the hands are brought together above the head while inspiring, and gradually brought down alongside the body while expiring. A deep breath must be taken with each inspiration, and held until the arms are gradually moved forward, or downward, or longer, in order to make both methods fully operative.

Another very serviceable chest exercise is to take a deep inspiration, and, during expiration, in a loud voice count or sing as long as possible. A male person with a good chest capacity can count up to sixty or eighty, while in a female, even with good lungs, this power is somewhat reduced. Practice of this sort will slowly develop the lungs, and the increased ability to count longer is a measure of the improvement going on within the chest. Or, again, the taking of six or eight full and deep breaths in succession every hour during the day, either while sitting at work or while walking out in the open air, will have a very beneficial effect.

The breathing of compressed and rarefied air is attracting wide attention at the present time in connection with the prevention and the treatment of pulmonary consumption, and

is another mode wherewith the chest capacity can be decidedly improved. When air is breathed in this manner, there is felt during each inspiration a gentle distention of the whole chest, while during expiration a feeling of emptiness is experienced.

Consumption is not a disease which originates in a day, but it is the outgrowth of morbid habits and agencies which may even antedate the birth of the individual. Defective breathing is one of these habits, and its pernicious prevalence is more widespread than is generally supposed.

"RIDERS OF TUNIS" is the title of an entertaining article, by Colonel T. A. DODGE, U.S.A., in the August *Harper's*, in which the writer describes the customs of the Arabs of the North African desert as well as the noble qualities of the horses. There are seven illustrations, engraved from photographs of Arabs and their mounts.

The Arab is a tall, straight-featured, well-shaped man, varying in color from a dark bronze to a tone quite as white as the European. He is decidedly handsome. Women are apt to be struck by the manly beauty of the Tunisian. He is, in his way, cleanly; he washes his feet before praying, and his hands and face before and after eating, and is apt to bathe in streams at not infrequent intervals. But, and in the Orient there is always a *but* on this subject, he can scarcely be gauged as up to our standard of what is next akin to godliness. One sees at the hut doors all too many instances of cerebral insecticide to be reconciled to the Arab as a clean mortal. No odor of nationality is apt, however, to exist in a dry climate, so that he is, *quoad* the nostril, unobjectionable. His value as a laborer is not great. Many of the pastoral Arabs who own flocks hire herdsmen for their food, fifteen francs, and two sheep a year. Lodging is *al fresco* most of the time.

I am, of course, not referring to the educated, intelligent Arab. I passed some days with the Kaliph of Kesar H'lal, and can truthfully say that I have never met a man with finer instincts, nobler presence, or more abundant courtesy. There are also sheiks who would murder you for your money—until you have broken bread with them; but so there are in America, and breaking bread with these will by no means save you.

A Surprise to the Pharisees.—The Stanford University is a subject by itself, apart from the personality of its founder; and many articles have been written to describe it, while many more will be written in the years to come. It is enough to say that it, more than any other institution that the world has seen, illustrates the possibility of mobilizing educational facilities *ad libitum*.

All sorts of sneering and sceptical predictions were made in the hoary abodes of conventional culture. The homely peregrinations of Mr. and Mrs. Stanford, who went in their kindly and simple way from one institution to another, were made the subject of many a jest in the circles of the chief priests and Pharisees of the pure academic cult. It is just possible that the next generation may turn the jest upon the jesters, and may discover that Mr. Stanford's ideas of education were far more true to natural principles and to present-day conditions than those of the distinguished men who found his questionings so naïve and so wholly diverting.

It was largely as a problem in educational science that Mr. Stanford had allowed his horse farm and its operations to interest his mind so deeply. He made himself the greatest of all the promoters of speed in the horse. He was growingly astonished to discover how the latent possibilities of the horse could be developed if once the best methods could be discovered and employed. And so he believed that great things might be done for young men and women by improving their surroundings and methods of training, and that the world would be enormously enriched by the production of a greater number of human beings developed for the realization of their largest possibilities.—*Albert Shaw, in sketch of Leland Stanford, August Review of Reviews.*

Limitations of Our Senses.—We gain our experience of the world through our senses. Man is born with intellect, and through the senses that intellect is trained. The newborn baby possesses already some knowledge of touch acquired before birth, and this knowledge he afterward rapidly expands by constantly feeling his body over and over, as if in exploration of unknown territory. Later he acquires the faculties of hearing and seeing, and likewise of tasting and smelling.

Now, these senses, five in number, are they which train the intellect. They are all very imperfect. Sight: but the greater part of the solar *spectrum* is invisible—that is to say, more rays which come to us from the sun are invisible than those which our eye can see. Hearing: but there are sounds so low and sounds so high that they are inaudible. Taste and smell: very imperfect. Touch: but there are millions of particles of dust to the square inch of the hand which we cannot feel. Yet, even with these imperfect means of education, many men have reached the conclusion satisfactory to themselves that they are clever; but the wisest man knows nothing in comparison with perfect wisdom.

The whole of the known universe consists of matter in motion. All sensation, everything we know of the outside world, comes to us through motion. The motion sets up a movement in the nerve ending, on the skin, on the retina of the eye, or wherever the proper ending capable of receiving the particular motion may be situated. This motion is carried from the nerve ending along the nerve to the special central organ of the brain where it is interpreted. Light, sound, touch, taste, and smell are the only forms of motion we are capable of appreciating, because for each of these forms of motion we have a special apparatus which can receive, transmit, and interpret. There are other forms of motion which we cannot appreciate—magnetism, for example—and this simply because we have no nervous mechanism which responds to that kind of motion. In like manner there can exist around us forces in infinite variety of which we have absolutely no knowledge whatsoever.—*From "The Material View of Life and its Relation to the Spiritual," by Professor Graham Lusk, in the Popular Science Monthly for August.*

PUBLICATIONS RECEIVED.

Proceedings of the State Sanitary Convention, held under the Auspices of California State Board of Health. Sacramento: H. S. Crocker Co.

Influence of Climate on Temperament. J. Mount Bleyer, M.D., New York.

Is Evolution Trying to do Away with the Clitoris? Robert T. Morris, M.D., New York.

The Literature of Sea-Sickness. J. A. Irwin, M.A., M.D., New York.

Surgical Clinic. Nicholas Senn, M.D., Chicago.

Treatment of Hernia. Alexander Dallas, M.D., New York.

Clinical Value of Refractive Error in Plastic Iritis. Charles A. Oliver, M.D., Philadelphia, Pa.

Errors in School Books. A. A. Pope, Boston, Mass.

Choleraic Diarrhœa. Lambert Pharmacal Co., St. Louis, Mo.

Traumatic Neurosis. R. Harvey Reed, Mansfield, O.

Acne, Comedo and Acne Rosacea. J. Abbott Cantrell, M.D., Philadelphia, Pa.

Paralysis of Laryngeal Muscles; Leptothrix Mycosis of the Tonsil, Pharynx and Tongue. William Cheatham, M.D., Louisville, Ky.

Reminiscences of the Founders of the Woman's Hospital Association. Thomas Addis Emmet, M.D., New York.

Nephrotomy; Progress of Cystoscopy; External Œsophagotomy (three pamphlets). Willy Meyer, M.D., New York.

Climate Treatment of Phthisis. Karl von Ruck, M.D., Asheville, N. C.

Vegetable Plates in Bowel and Stomach Surgery. R. H. M. Dawbarn, M.D., New York.

Our Dispensaries, Hospitals, Philanthropy, Frauds, and the Necessity of Medical Reform. L. F. Criado, M.D., New York.

Points of Similarity between Us and Homœopathists. John B. Roberts, M.D., Philadelphia, Pa.

Cure of Complete Prolapse of the Rectum. *Ibid.*

Quarantine Administration at the Port of Philadelphia. Board of Health Report, Philadelphia, Pa.

From J. B. Mattison, M.D., Medical Director, Brooklyn Home for Habitués:

Cocaine Inebriety;

Cocaine Poisoning;

The Mattison Method of Morphinism;

The Etiology of Narcotic Inebriety;

Twenty-seven Years Addiction to Opium—Recovery—Relapse ;

Trionæ, the New Hypnotic.

Elastic Constriction as a Hæmostatic Measure—Further Remarks upon, with a Letter from Professor Von Esmarch. N. Senn, M.D., Chicago, Ill.

Treatment of Cholera by Hypodermoclysis and Enteroclysis. Judson Daland, M.D., Philadelphia, Pa.

Apparent and Actual Mortality. F. D. Bullard, M.D., Los Angeles, Cal.

Importance of Early Mechanical Treatment in Hip Joint Disease in Young Children. A. E. Hoadley, M.D., Chicago, Ill.

Cholecystotomy. Edwin Ricketts, M.D., Chicago, Ill.

Eczema Infantile. B. Merrill Ricketts, M.D., Cincinnati, O.

Varicocele. *Ibid.*

Indications for Amputation in Chronic Diseases of the Larger Bones and Joints. J. E. Summers, Jr., M.D., Omaha, Neb.

Stearns' Dose Book. Frederick Stearns & Co., Detroit, Mich.

Colles Fracture. E. H. Woolsey, M.D., Oakland, Cal.

Investigation by the State Board of Health Relating to the Burning of Strafford County Asylum for the Insane, etc. Irving A. Watson, M.D., Secretary, Concord, N. H.

Physiological Experiments with Magnets. Drs. Frederick Peterson and A. E. Kennelly, New York.

Climatic Features of the Pines of New Jersey. Isaac Hull Platt, M.D., Lakewood, N. J.

Some of the Effects of "Withdrawal." L. Bolton Bangs, M.D., New York.

Certificates of Death. P. C. Remondino, San Diego, Cal.

Osteitis Deformans. Henry Ling Taylor, M.D., New York.

Management of Suppuration, Complicating Tuberculous Disease of the Bones and Joints. *Ibid.*

Treatment of Club-Foot by Continuous Leverage. *Ibid.*

Bow-Legs. A. E. Hoadley, M.D., Chicago, Ill.

Address on Work. Professor J. S. Wight, M.D., Brooklyn, N. Y.

Report of Eighty Operations Performed before the Medical Class of the Long Island College Hospital. *Ibid.*

Annual Report of the Chief Signal Officer, 1891. Oliver L. Fassig, Librarian, Washington, D. C.

Thirty-Second Annual Report of the Cincinnati Hospital. P. Alfred Marchand, Custodian, Cincinnati, O.

Forty-seventh Annual Report of the Brooklyn, E. D., Dispensary and Hospital, 1892. George V. Tompkins, Secretary, Brooklyn, E. D., N. Y.

The National Christian League for the Promotion of Social Purity: Constitution and Sunday Publications. Mrs. E. B. Grannis, President, 33 East Twenty-second Street, New York.

Epilepsy, its Curability Established. A. G. Selman, M.D., Indianapolis, Ind.

ANNOUNCEMENTS.

The American Medical Editors will have a meeting and banquet in Washington on the evening of Monday, September 4th, the day preceding the assembling of the Pan-American Medical Congress.

Dr. I. N. Love, of the *Medical Mirror*, 3642 Lindell Avenue, St. Louis, has been appointed Chairman of the Committee of Arrangements for Banquet, which fact gives ample assurance of the success of the latter.

It is earnestly hoped that every medical editor of all of the Americas will endeavor to be present on the interesting occasion. Please address the Chairman of Committee of Arrangements promptly.—*Editorial in Alienist and Neurologist, July*, 1893.

Messrs. William Wood & Co. are pleased to announce that they have in press, and shall publish early in the coming autumn, a very important work on

Medical Jurisprudence and Toxicology, prepared by experts of acknowledged authority under the supervision and editorship of R. A. Witthaus, M.D., of New York, and Tracy C. Becker, Esq, of Buffalo, N. Y.

AMERICAN PUBLIC HEALTH ASSOCIATION.

PRELIMINARY ANNOUNCEMENT.

THE twenty-first annual meeting, which, in connection with the World's Congress Auxiliary of the World's Columbian Exposition, will constitute an

INTERNATIONAL CONGRESS OF PUBLIC HEALTH, to be held at CHICAGO, ILL., Monday, Tuesday, Wednesday, Thursday, Friday, and Saturday, October 9th, 10th, 11th, 12th, 13th, 14th, 1893.

SECRETARY'S OFFICE, CONCORD, N. H., August 1, 1893.

The twenty-first annual meeting will be held under a plan which will differ very materially from that of any former meeting of the A. P. H. A. Through an arrangement entered into by the World's Congress Auxiliary and this Association, the forthcoming meeting will constitute an International Congress of Public Health, and committees are already at work to make it a grand success. Invitations have already been extended to foreign countries to participate in the meeting, and to the most prominent sanitarians throughout the world to present papers.

The regulations which will govern this meeting are outlined in this circular. Particular attention is called to the fact that the meeting will be held in sections; therefore, persons presenting papers will note under which section their papers will properly come. The classification given under each section will also suggest the topics upon which papers are desired.

It is suggested that members who intend to visit the World's Fair postpone their trip until the meeting of this Congress, as there will be no better month in which to see the Fair. Another circular will be issued before the meeting, giving additional particulars.

IRVING A. WATSON,
Secretary.

THE ELEVENTH INTERNATIONAL CONGRESS OF MEDICINE has been postponed from the time announced in our August number to next year.

THE SANITARIAN.

OCTOBER, 1893.

NUMBER 287.

MINERAL SPRINGS OF VIRGINIA.*

By A. N. BELL, A.M., M.D.

THE MINERAL SPRINGS of Virginia are of almost every variety, and some of them of world-wide repute, notably the White Sulphur, to be considered hereafter under *Western* Virginia.

They are situated for the most part in the midst of delightful scenery and salubrious climate, accessible by the Baltimore and Ohio and Norfolk and Western railroads. Not infrequently springs of widely different chemical and therapeutical properties are found in the same vicinity ; and for this reason I have designated the classes to which they belong severally, in course, instead of grouping them.

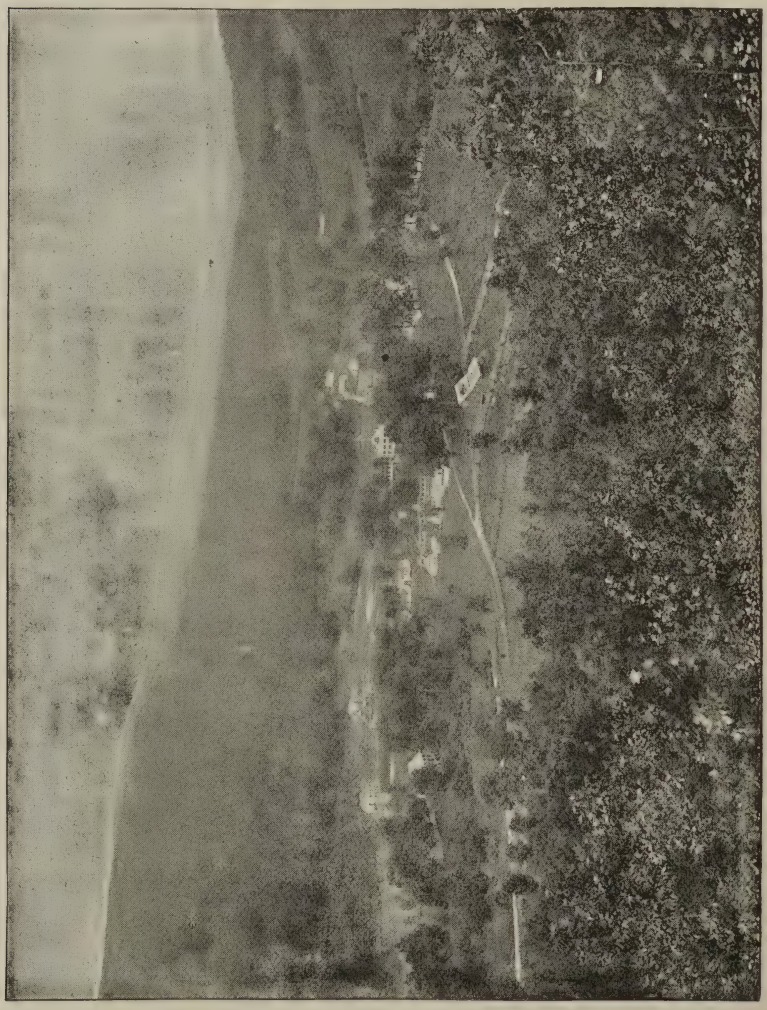
The Hot, Warm, Sulphur, and Healing Springs are all located in a narrow valley between two lofty mountain ranges that lie east of and parallel with the main Alleghany divide, in Bath County. The valley extends for about fifteen miles between towering mountains, from the crests of which, 4000 feet above the sea, settlements and intervening stretches of country over 1500 feet below are spread out to the view of the observer as a beautiful panorama.

A branch railway, twenty-five miles long, recently built by the Chesapeake and Ohio Railway Company, connecting with its main line at Covington, Va. (twenty-two miles east of White Sulphur Springs), ends at Hot Springs.

Bath County extends from the western limits of Augusta County to the Alleghany Mountains, which is here the boundary between Virginia and West Virginia. This county

* Continued from page 166.

is very mountainous and broken, and is well watered by the Jackson and the Cow Pasture rivers and their numerous tributaries. Shortly beyond the southern border of the county, these two rivers unite near Clifton Forge, in Alleghany



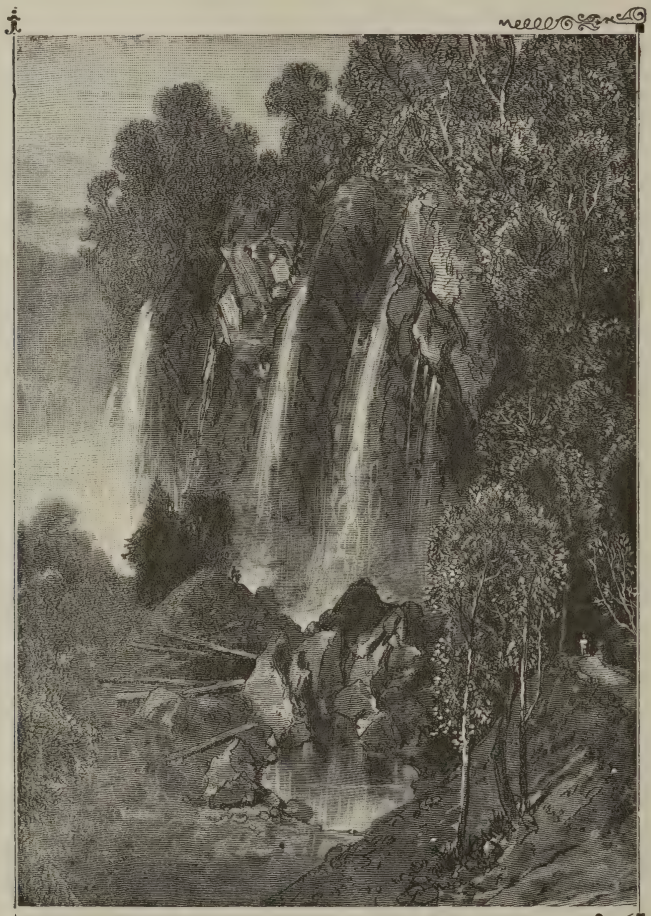
County, to form the James River. Within the limits of the county they skirt the base of the mountains on one or both sides, but elsewhere considerable tracts of alluvial flats intervene, and these constitute a large part of the most valuable

arable land of the county, though in many places not only the subordinate valleys, but the sides of the mountains for a considerable distance from their base, are susceptible of remunerative tillage. Among these subordinate valleys, that which derives its popular name of "The Warm Springs Valley," from the numerous thermal sources which it affords, is much the most remarkable. It is bounded on the east by "The Warm Springs Mountain," which extends for a distance of more than thirty miles in a straight direction and without a gap, while, on the west, the mountain barrier is a deeply serrated ridge; the gaps, which are found at short distances apart, extending quite to the foot of the ridge, and presenting extremely picturesque gorges, in some places barely wide enough for the passage of a creek and a narrow road-bed which frequently crosses the winding stream, according to the exigencies of the situation. These creeks, having watered the valleys into which their waters descend from the mountain-sides, find thus a ready outlet by these numerous gorges into the larger valley of Jackson River. This somewhat peculiar topographical feature insures a perfection of drainage and atmospheric circulation, not often attainable in narrow valleys surrounded by lofty mountains which exclude the sun's rays for a large part of the day, oppose insurmountable barriers to the ready escape of the waters by surface drainage, and obstruct the circulation of the atmosphere.

The Hot Springs lie at the head of one of these intersecting gorges, and Cedar Creek, which results from the united body of their waters, rushes down the steep declivity of the gorge, so as to clear the main valley within a few feet from their sources. Through this western gap the rays of the evening sun brighten the settlement long after its disk has sunk behind the mountain in other parts of the valley. Twelve to fifteen miles from the Hot Springs the valley terminates abruptly by merging into that of Jackson River, but at an elevation of about 200 feet above the latter; and just here the Falling Springs Creek, descending from the Warm Springs Mountain on the east, crosses the road, and then presents the picturesque spectacle of an unbroken fall from the top of the precipice to the valley beneath. This miniature cataract, miniature as to breadth and volume of water, is half as high again as that of

Niagara, and was considered by Mr. Jefferson worthy of being mentioned and described in his "Notes on Virginia."

The average elevation of the valley above the sea-level is about 1600 feet, and that of the mountain ridge 2500 feet. The mountain is of white sandstone, but the rocks of the val-



PICTURESQUE B. & O.—FALLING SPRINGS.

ley are chiefly limestone, and the calcareous soil abounds in caverns. The springs for the most part contain a notable amount of carbonate and a small quantity of sulphate of lime; but those which issue from the mountain-sides a short distance above their base have no calcareous matter, or so little

as not to be sensibly affected by the ammonium oxalate test. Their water is pure and sparkling, and it has accordingly been utilized for drinking and cooking purposes as a substitute for the more highly mineralized water of the valley. Similar arrangements for the water-supply exist at the Warm Springs, five miles north, and at the Healing Springs, three miles south of the Hot Springs.

The late Professor J. L. Cabell, of the University of Virginia, and President of the National Board of Health, in a contribution to THE SANITARIAN some years ago (Vol. IV., p. 253), quotes the recorded temperature of the three *hottest* days in summer at Hot Springs, as follows :

July 18th, 1875, at 6 A.M., 78° F.; at 12 M., 84° ; at 6 P.M., 85°.
Aug. 18th, " " " 70° F.; " " 76° ; " " 72°.
Sept. 4th, " " " 70° F.; " " 77° ; " " 74°.

The mean temperature for the three summer months registered at the three specified hours was 66°. After nine o'clock at night, or often earlier, there is a depression of several degrees, but no record has been kept of the minimum night temperature. More frequently than otherwise, blankets are required, even by persons in strong health.

With regard to the general salubrity of the region, Professor Cabell verified his own extended observation by the practical experience of Dr. B. F. Hopkins, a medical practitioner in this valley for many years, that there is absolutely no malaria ; and that although Dr. Hopkins's practice ranged over an area of more than fifty miles square, but for obstetrical practice he said he could not make a living.

Hot and Warm Springs, Bath County.

The waters of these springs have been analyzed by several distinguished chemists, with nearly identical results. The Spout, Boiler, and Sulphur Springs were analyzed by Professor Clarke of the Smithsonian Institute, in 1884, and the last two, together with the Soda and Magnesia Springs, have recently been analyzed by Messrs. Dickoré and Morgan, of Cincinnati, O.

Magnesia (Drinking) Spring. Temperature, 100° F.

Alkaline Calcic.

Magnesium sulphate, grains per gallon..... 9.068

Magnesium carbonate,	grains	per gallon	3.095
Calcium sulphate,	"	"	1.555
Calcium carbonate,	"	"	23.589
Sodium sulphate,	"	"	2.917
Potassium sulphate,	"	"	1.874
Potassium chloride,	"	"	.596
Silica,	"	"	1.148
Total	"	"	43.842

Soda (Drinking) Spring. Temperature, 74° F.

Alkaline Calcic.

Magnesium sulphate,	grains	per gallon	5.901
Magnesium carbonate,	"	"	2.610
Calcium sulphate,	"	"	3.224
Calcium carbonate,	"	"	17.546
Sodium sulphate,	"	"	2.025
Potassium sulphate,	"	"	.876
Potassium chloride,	"	"	.209
Silica,	"	"	.492
Total	"	"	32.883

Sulphur (Bath and Drinking) Spring. Temperature, 102° F.

Alkaline Calcic.

Magnesium sulphate,	grains	per gallon	7.991
Magnesium carbonate,	"	"	2.727
Calcium sulphate,	"	"	4.084
Calcium carbonate,	"	"	21.180
Sodium sulphate,	"	"	2.842
Potassium sulphate,	"	"	1.183
Potassium chloride,	"	"	.417
Silica,	"	"	1.388
Total	"	"	41.812

Boiler (Bath) Spring. Temperature, 108° F.

Alkaline Calcic.

Magnesium sulphate,	grains	per gallon	8.476
Magnesium carbonate,	"	"	3.018
Calcium sulphate,	"	"	1.895
Calcium carbonate,	"	"	23.076

Sodium sulphate,	grains per gallon		3.684
Potassium chloride,	"	"	.539
Silica,	"	"	1.946
Total	"	"	42.614

Carbonic acid gas given off freely, but not measured.

Spout (Bath) Spring. Temperature, 106° F.

Acidulated.

Silica,	grains per gallon		1.3727
Sulphuric acid,	"	"	7.5823
Chlorine,	"	"	.2570
Alumina,	"	"	.1460
Calcium,	"	"	8.0321
Magnesium,	"	"	2.0036
Sodium,	"	"	.5316
Potassium,	"	"	.7711
Carbonic acid,	"	"	13.9144
Total	"	"	34.611

Warm Sulphur Springs.

No. 1. Temperature, 96°–98° F. W. B. Rogers, analyst.

Sulphuretted.

Calcium carbonate,	grains per gallon		4.29
Calcium sulphate,	"	"	5.47
Magnesium sulphate,	"	"	9.98
Calcium chloride,	"	"	3.97
Soda,			trace.
Total	"	"	23.71

Gases.

Sulphuretted hydrogen,	cubic inches		0.19
Nitrogen,	"	"	1.62
Carbon dioxide,	"	"	2.64

No. 2. A. A. Hayes, analyst.

Acidulated Calcic.

Calcium carbonate,	grains per gallon		5.22
Calcium sulphate,	"	"	14.53

Potassium sulphate,	grains per gallon	.....	1.38
Ammonium sulphate,	" "	.....	0.36
Sodium silicate, Magnesium silicate,	" "	.....	1.72
Iron crenate,	" "	.....	2.50
Carbonic acid,	" "	.....	6.92
Total	" "	.....	32.63

Gases.

Carbonic acid,	cubic inches	.....	1.02
Sulphuretted hydrogen,	" "	.....	0.25
Nitrogen,	" "	.....	3.25

A similarity of the constituents of the waters of the Virginia Hot Springs to the waters of Aix-les-Bains, France, and like similarity of effects have been noticed by several observers. The temperatures of the two springs at Aix are somewhat higher, but as the waters require cooling in most cases to a temperature below that of the Virginia Hot Springs, it is probable that the greater original heat is of no advantage, if, indeed, it is not a disadvantage, inasmuch as loss of heat is attended with precipitation and loss of ingredients held in solution.

Mr. F. M. Hersey, civil and sanitary engineer, employed on the staff of Mr. Ernest W. Bowditch, landscape and sanitary engineer, Boston, Mass., was sent by this company to Europe a few years ago, to examine and report upon the principal spring resorts. A comparison of the following abstract from his report with the analysis of the Boiler (Bath) Spring, as above given, verifies the similarity.

Aix-les-Baines. M. Wilm, Aix, analyst.

Sulphurous Spring. Temperature, 103° F.

Sulphuretted.

Free sulphuretted hydrogen,	grains per gallon	....	21 to 27
Sulphur under form of hyposulphate,	" "	....	.23
Carbonic acid gas,	" "	....	5.85
Carbonate of lime,	" "	....	11.88
Carbonate of magnesia,	" "	....	.65
Carbonate of iron,		....	trace.
Silica,	" "	....	3.00

Sulphate of lime,	grains per gallon.....	5.82
Sulphate of magnesia,	" "	4.58
Sulphate of sodium,	" "	2.05
Phosphate of lime,	" "	.41
Sulphate of alumina,	" "	.50
Chloride of sodium,	" "	1.88

"Alum Spring." Temperature, 115° F.

Alkaline.

Free sulphuretted hydrogen,	grains per gallon..	.23
Sulphur under form of hypophosphate,	" " ..	.22
Carbonic acid gas,	" " ..	5.53
Carbonate of lime,	" " ..	10.18
Carbonate of magnesia,	" " ..	1.10
Silica,	" " ..	3.38
Sulphate of lime,	" " ..	4.90
Sulphate of magnesia,	" " ..	3.09
Sulphate of sodium,	" " ..	3.42
Chloride of sodium,	" " ..	1.70
Carbonate of iron, sulphate of alumina, and phosphate of lime.....		traces.

Bath Alum Springs, Bath County.

No. 1. F. A. Genth, analyst.

Calcium sulphate,	grains per gallon.....	3.80
Magnesium sulphate,	" "	2.82
Sodium silicate,	" "	2.02
Ammonium crenate,	" "	1.85
Sodium chloride,	" "	0.17
Iron oxide,	" "	14.52
Alumina,	" "	10.29
Sulphuric acid,	" "	5.81
Carbonic acid,	" "	4.14
Oxygen added to sodium,	" "	0.02
Total	" "	45.44

Gases.

Carbonic acid, cubic inches.....	4.652

No. 2. W. H. Taylor, analyst.

Sodium sulphate,	grains per gallon.....	1.13

Calcium sulphate,	grains per gallon	.....	1.71
Lithium sulphate		.....	trace.
Magnesium sulphate,	"	.....	0.06
Potassium sulphate,	"	.....	0.34
Aluminium sulphate,	"	.....	29.99
Ammonium sulphate,		.....	trace.
Manganese sulphate,	"	.....	0.03
Iron persulphate,	"	.....	26.78
Sodium chloride,	"	.....	0.11
Silica,	"	.....	1.95
Sulphuric acid,	"	.....	2.88
Total	"	.....	65.38

No. 3. A. A. Hayes, analyst.

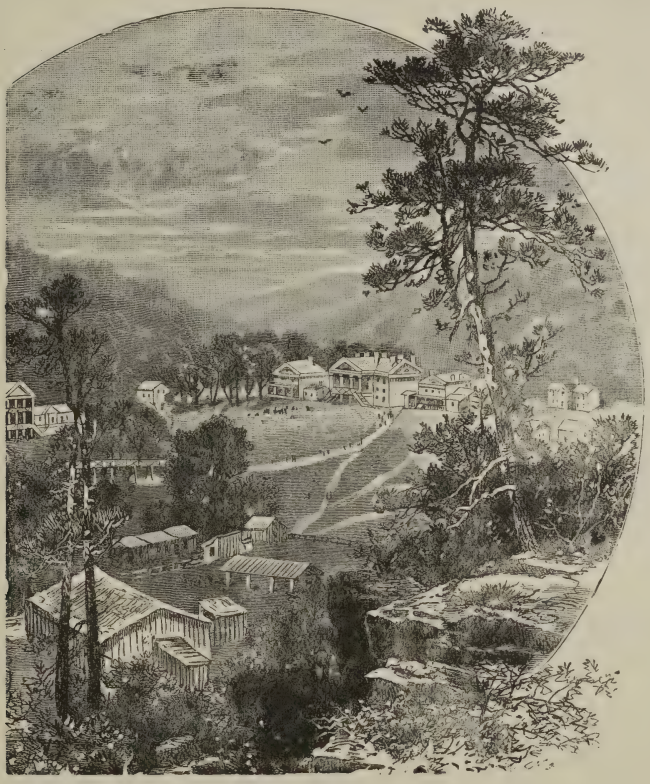
Potassium sulphate,	grains per gallon	.....	0.26
Aluminium sulphate,	"	.....	3.15
Ammonium crenate,	"	.....	1.77
Magnesia,	"	.....	1.28
Iron oxide,	"	.....	21.77
Alumina,	"	.....	12.29
Sulphuric acid,	"	.....	7.88
Carbonic acid,	"	.....	3.85
Apocrenic acid,	"	.....	2.54
Total	"	.....	54.79

Cave Spring, Bath County. W. H. Taylor, analyst.

Chalybeate.

Calcium bicarbonate,	grains per gallon	.....	0.69
Magnesium bicarbonate,	"	.....	1.98
Manganese bicarbonate,	"	.....	0.64
Iron bicarbonate,	"	.....	2.18
Sodium sulphate,	"	.....	0.30
Calcium sulphate,	"	.....	0.32
Lithium sulphate,		.....	trace.
Potassium sulphate,	"	.....	0.17
Aluminium sulphate,	"	.....	0.02
Calcium phosphate,		.....	trace.
Calcium chloride,	"	.....	0.06
Silica,	"	.....	0.45
Total	"	.....	6.81

Healing Springs, Bath County. W. E. Aiken, analyst.



Old Spring. *Alkaline.*

Sodium carbonate,	grains	per gallon	17.90
Magnesium carbonate,	"	"	1.25
Iron carbonate,	"	"	0.07
Calcium sulphate,	"	"	1.32
Magnesium sulphate,	"	"	7.25
Potassium sulphate,	"	"	2.21
Ammonium sulphate,	"	"	0.23
Iron sulphate,	"	"	0.18
Sodium chloride,	"	"	0.27
Potassium chloride,	"	"	0.24
Silica,	"	"	1.89
Carbonic acid,	"	"	2.20

Organic matter, grains per gallon		0.86
Bromine, iodine, and sulphuretted hydrogen		traces.
Total grains per gallon		34.87

New Spring. *Alkaline Calcic.*

Calcium carbonate, grains per gallon		18.72
Magnesium carbonate, " "		1.96
Iron carbonate, " "		0.28
Calcium sulphate, " "		1.26
Magnesium sulphate, " "		7.39
Potassium sulphate, " "		2.53
Ammonium sulphate, " "		0.23
Iron sulphate, " "		0.10
Sodium chloride, " "		2.89
Potassium chloride, " "		0.25
Silica, " "		1.82
Carbonic acid, " "		2.29
Organic acid, " "		0.88
Bromine, iodine, and sulphuretted hydrogen		traces.
Total grains per gallon		40.60

Wallawhatoola Alum Springs, three and one quarter miles from Millborough Depot, Bath County.

No. 1. J. L. Campbell, analyst.

Calcium sulphate, grains per gallon		13.27
Aluminium sulphate, " "		72.10
Magnesium sulphate, " "		2.31
Potassium sulphate, " "		2.09
Sodium sulphate, " "		2.12
Iron protosulphate, " "		5.39
Sodium silicate, " "		2.04
Sodium chloride, " "		0.39
Lithia,		trace.
Sulphuric acid, " "		33.82
Organic matter, " "		1.75
Total " "		135.28

Gases.

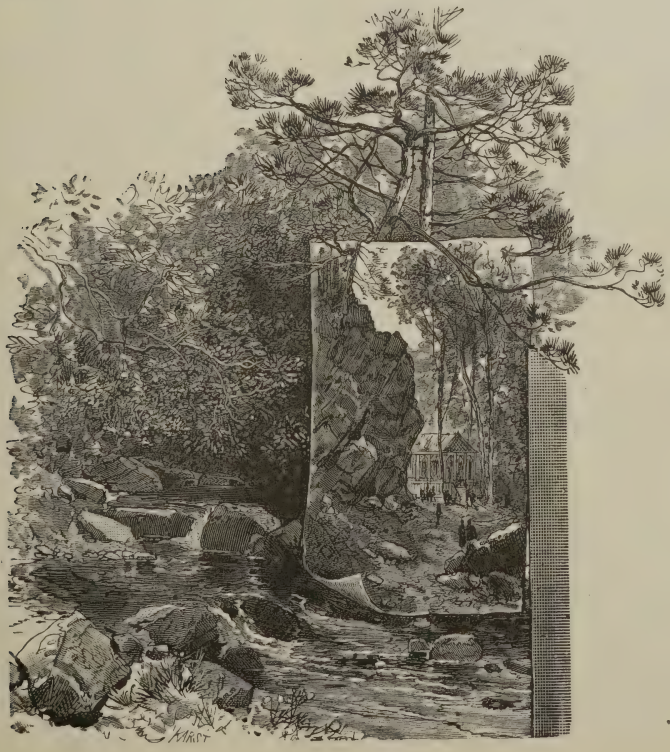
Carbonic in excess.

No. 2. C. F. Chandler, analyst.

Calcium carbonate, grains per gallon		7.538

Aluminium sulphate,	grains per	gallon	137.889
Magnesium sulphate,	"	"	15.434
Lithium sulphate,	"	"	0.128
Manganese sulphate,	"	"	1.245
Potassium and aluminium sulphate,	"	"	3.867
Iron protosulphate,	"	"	0.489
Iron persulphate,	"	"	23.741
Calcium phosphate,	"	"	0.055
Sodium chloride,	"	"	0.710
Lithia,			trace.
Iron oxide or protoxide,	"	"	20.040
Silica,	"	"	4.111
Organic matter			trace.
Total	"	"	199.408

Rock Enon Springs, Frederick County. Gale and Mew, analysts.



Alkaline, Chalybeate.

Sodium carbonate,	grains per gallon	1.21
Calcium carbonate,	" "	5.13
Calcium sulphate,	" "	3.56
Magnesium sulphate,	" "	12.89
Magnesium chloride,	" "	1.12
Iron oxide or protoxide,	" "	14.25
Manganese protoxide,	" "	1.05
Alumina,	" "	0.80
Silica,	" "	0.42
Total	" "	40.43

Jordan's White Sulphur Springs, Frederick County. Thomas Antisell, analyst.

Sulphuretted.

Magnesium carbonate,	grains per gallon	2.88
Potassium carbonate,	" "	9.71
Manganese carbonate,	" "	0.01
Iron carbonate,		trace.
Calcium sulphate,	" "	5.13
Potassium sulphate,	" "	2.09
Sodium chloride,	" "	0.76
Alumina,	" "	0.01
Silica,	" "	0.25
Sulphuretted hydrogen,	" "	0.79
Total	" "	21.63

Wilson's Thermal Spring, Daggers, Botetourt County. W. B. Rogers, analyst. Temperature, ° F.

Calcareous.

Calcium carbonate,	grains in 100 cubic inches	5.00
Magnesium carbonate,	" " "	0.52
Sodium sulphate,	" " "	3.53
Calcium sulphate,	" " "	8.09
Magnesium sulphate,	" " "	1.30
Sodium chloride,		little.

Magnesium chloride,	little.
Iron peroxide,	trace
Total, grains in 100 cubic inches	18.44

McHenry's Thermal Spring, Scott County. W. B. Rogers, analyst. Temperature, 68° F.

Calcareous.

Calcium carbonate,	grains in 100 cubic inches			6.34
Magnesium carbonate,	"	"	"	1.54
Sodium sulphate,	"	"	"	3.77
Calcium sulphate,	"	"	"	7.83
Magnesium sulphate,	"	"	"	0.25
Magnesium chloride, Calcium chloride,	"	"	"	0.68
Iron peroxide,				trace.
Organic matter,				little.
Total	"	"	"	20.41

Undetermined.

Holston Springs, near Big Moccasin Gap, Scott County. No. 1. E. T. Fristoe, analyst.

Calcareous.

Calcium carbonate,	grains per gallon		6.40
Sodium sulphate,			trace.
Calcium sulphate,	"	"	20.48
Magnesium sulphate,	"	"	12.72
Aluminium,			trace.
Sodium chloride,	"	"	1.52
Total,	"	"	41.12

No. 2. Hayden, analyst.

Calcareous.

Calcium carbonate,	grains per gallon		6.40
Calcium sulphate,	"	"	20.48
Magnesium sulphate,	"	"	12.72

Sodium chloride, grains per gallon	1.52
Sodium sulphate, aluminium sulphate, and aluminium phosphate	traces.
Total grains per gallon	41.12

Roanoke Red Sulphur Springs, near Salem, Roanoke County.

A particularly romantic region of the Alleghanies, much extolled by visitors for the purity of the atmosphere and objects of interest round about.

"Murder Hole," an enormous hole in the ground, 136 feet deep and 300 × 60 feet in length and breadth, with sides of solid rock, the entrance to an immense cold cavern only a few miles distant, is only second in interest as a curiosity to the Natural Bridge.

Descent has been made into it by means of ropes, and it has been explored to the extent of about 1250 feet, revealing several large chambers. A particularly remarkable feature of it, as compared with other great caverns, is the low temperature (44° F.) during the hottest days of summer. Yet the floor is said to be covered with beautiful mosses and ferns. The promise for the early future is that which remains to be discovered.

Another freak of nature near by is the Flowing Spring—a spring which regularly flows twice daily, about one hour each time, and then subsides. The cause of this action has been the subject of much speculation, as that of the Geysers of Montana. Some have even ventured to suggest that it is in some way dependent upon the ebbing and flowing of the tides, though the location of this spring is 2000 feet above sea level.

But the most conspicuous object in the vicinity is the view point of one of the grandest landscapes in the United States —McAfee Knob (page 337), 4000 feet above the level of the sea.

M. B. Hardin, analyst.

Sulphuretted.

Calcium carbonate, grains per gallon	6.53
Magnesium carbonate, " "	5.84
Lithium carbonate, " "	0.02
Manganese carbonate, " "	0.02

Iron carbonate,	grains per gallon		0.06
Sodium carbonate,	"	"	3.04
Calcium sulphate,	"	"	2.19
Potassium sulphate,	"	"	0.33
Strontium sulphate,	"	"	1.71
Sodium hyposulphite,	"	"	0.03
Ammonium nitrite,	"	"	0.05
Calcium phosphate,	"	"	0.03
Sodium chloride,	"	"	0.24
Ammonium chloride,	"	"	0.02
Alumina,	"	"	0.01
Silica,	"	"	0.84
Organic matter,	"	"	0.76
Copper carbonate, barium sulphate, lead sulphate, and arsenic			traces.
Total grains per gallon			21.71

Gases.

Carbonic acid,	cubic inches	12.40
Sulphuretted hydrogen,	" "	2.44

Stribling or Augusta Springs, Augusta County. D. K. Tuttle, analyst.

No. 1. *Chalybeate Acidulated.*

Sodium carbonate,	grains per gallon		0.76
Calcium carbonate,	"	"	1.50
Magnesium carbonate,	"	"	0.98
Potassium carbonate,	"	"	0.35
Iron carbonate,	"	"	0.07
Calcium sulphate,	"	"	0.22
Silica,	"	"	1.33
Total	"	"	5.21
Carbonic acid, cubic inches,			24.00

No. 2. *Alkaline Acidulated.*

Sodium carbonate,	grains per gallon		6.24
Calcium carbonate,	"	"	9.63
Magnesium carbonate,	"	"	2.01
Potassium carbonate,	"	"	0.74

Iron carbonate,	grains per gallon	0.13
Calcium sulphate,	" "	1.25
Sodium chloride,	" "	0.64
Silica,	" "	0.64
Total	" "	21.28
Carbonic acid,	cubic inches	10.40
Sulphuretted hydrogen,	" "	0.24

No. 3. *Alkaline Acidulated.*

Sodium carbonate,	grains per gallon	0.99
Calcium carbonate,	" "	0.83
Magnesium carbonate,	" "	1.10
Potassium carbonate,	" "	0.76
Iron carbonate,	" "	0.11
Calcium sulphate,	" "	3.09
Silica,	" "	0.91
Total	" "	7.79
Carbonic acid,	cubic inches	16 00

No. 4. Alum Spring.

Sodium sulphate,	grains per gallon	0.66
Calcium sulphate,	" "	14.65
Magnesium sulphate,	" "	0.53
Potassium sulphate,	" "	0 54
Aluminium sulphate,	" "	16.69
Iron sulphate,	" "	9.54
Sodium sulphate,	" "	0 66
Silica,	" "	1.95
Sulphuric acid,	" "	5.05
Organic matter,	" "	3.75
Total	" "	53 36

No. 5. Alum Spring.

Calcium sulphate,	grains per gallon	16 95
Magnesium sulphate,	" "	0 34
Potassium sulphate,	" "	0.90
Aluminium bisulphate,	" "	17.95
Iron sulphate,	" "	13.14

Sodium sulphate,	grains per gallon	.....	2.35
Silica,	" "	.....	2.11
Sulphuric acid,	" "	.....	9.82
Total	" "	.....	63.56

No. 6. Alum Spring.

Calcium sulphate,	grains per gallon	.....	19.11
Magnesium sulphate,	" "	.....	6.57
Potassium sulphate,	" "	.....	0.01
Aluminium bisulphate,	" "	.....	38.41
Iron sulphate,	" "	.....	12.32
Sodium sulphate,	" "	.....	1.79
Silica,	" "	.....	2.11
Sulphuric acid,	" "	.....	6.54
Total	" "	.....	88.46

No. 7. Alum Spring.

Calcium sulphate,	grains per gallon	.....	6.88
Magnesium sulphate,	" "	.....	3.37
Potassium sulphate,	" "	.....	1.32
Aluminium bisulphate,	" "	.....	16.68
Iron sulphate,	" "	.....	12.13
Ammonium crenate,	" "	.....	0.63
Sodium chloride,	" "	.....	0.64
Silica,	" "	.....	1.65
Sulphuric acid,	" "	.....	9.09
Carbonic acid,	" "	.....	3.57
Total	" "	.....	55.86

Alkaline Sulphuretted.

J. L. Campbell, analyst.

Sodium carbonate,	grains per gallon	.....	1.20
Calcium carbonate,	" "	.....	5.52
Magnesium carbonate,	" "	.....	3.87
Sodium sulphate,	" "	.....	0.81
Potassium sulphate,	" "	.....	0.44
Calcium sulphate,		.....	trace.
Sodium silicate,	" "	.....	0.25

Sodium chloride,	grains per gallon	0.61
Carbonic acid,	" "	3.90
Organic matter,	" "	1.23
Total	" "	17.83
Sulphuretted hydrogen, cubic inches		0.91

Edmondson's Spring, or Lebanon White Sulphur Springs, Augusta County. W. B. Rogers, analyst.

Alkaline.

Sodium carbonate,	grains in 200 cubic inches	1.32
Calcium carbonate,	" " "	2.77
Sodium sulphate,		trace.
Sodium chloride,	" " "	0.12
Magnesium carbonate, Iron peroxide, Silica, Organic matter,	quantities not given	
Total grains in 200 cubic inches		7.38



On the Road to Orkney.

Orkney Springs, Shenandoah County.

No. 1. Healing Spring. J. W. Mallet, analyst.

Alkaline.

Sodium carbonate,	grains per gallon	0.02
Calcium carbonate,	" "	9.93

Magnesium carbonate,	grains per gallon	.....	1.36
Lithium carbonate,		.....	trace.
Manganese carbonate,		.....	trace.
Iron carbonate,	" "	.....	0.56
Calcium sulphate,	" "	.....	1.38
Potassium sulphate,	" "	.....	0.23
Aluminium sulphate,	" "	.....	0.03
Calcium phosphate,	" "	.....	0.01
Sodium chloride,	" "	.....	0.15
Potassium chloride,	" "	.....	0.04
Calcium fluoride,		.....	trace.
Silica,	" "	.....	1.00
Carbonic anhydride,	" "	.....	5.39
Total	" "	.....	20.10

Gases.

Sulphuretted hydrogen,	cubic inches	.....	
Oxygen,	" "	.....	1.64
Nitrogen,	" "	.....	3.05
Carbon dioxide,	" "	.....	4.64

No. 2. Powder Spring.

Alkaline, Sulphuretted.

Sodium carbonate,	grains per gallon	.....	3.91
Calcium carbonate,	" "	.....	4.59
Magnesium carbonate,	" "	.....	3.54
Manganese carbonate,	" "	.....	0.02
Iron carbonate,	" "	.....	0.26
Calcium sulphate,	" "	.....	0.11
Potassium sulphate,	" "	.....	0.19
Aluminium sulphate,	" "	.....	0.02
Sodium sulphide,	" "	.....	0.53
Sodium chloride,	" "	.....	0.43
Potassium chloride,	" "	.....	0.03
Silica,	" "	.....	1.66
Carbonic anhydride,	" "	.....	5.60

Lithium carbonate, strontium sulphate, barium sul-

phate, copper sulphate, calcium sulphate, ammonium chloride, arsenic, and organic matter.....	traces.
Total grains per gallon.....	20.89

Gases.

Sulphuretted hydrogen, cubic inches.....	5.91
Nitrogen, " "	2.85
Carbon dioxide, " "	8.62

No. 3. Bear Wallow Spring.

Sulphurous Chalybeate.

Calcium sulphate, grains per gallon	0.86
Lithium sulphate, " "	0.07
Magnesium sulphate, " "	2.94
Potassium sulphate, " "	0.25
Aluminium sulphate, " "	0.06
Manganese sulphate, " "	0.02
Iron sulphate, " "	5.45
Calcium phosphate, " "	0.01
Sodium chloride, " "	0.11
Potassium chloride, " "	0.08
Silica, " "	1.85
Sulphuric acid, " "	0.43
Organic matter, " "	0.07
Total " "	12.20

Gases.

Oxygen, cubic inches.....	0.46
Nitrogen, " "	1.52
Carbon dioxide, " "	5.78

Shenandoah Alum Springs, Shenandoah County. W. Mallet, analyst.

Alum Chalybeate.

Iron oxide or protoxide, grains per gallon.....	5.32
Alumina, " "	12.39
Sulphuric acid, " "	59.54
Total " "	77.15

Alum Spring, at Variety Springs, near Pond Gap, Augusta County. William Gilham, analyst.

Calcium sulphate,	grains	per gallon	13.33
Magnesium sulphate,	"	"	11.64
Potassium sulphate,	"	"	0.29
Aluminium sulphate,	"	"	34.41
Iron protosulphate,	"	"	5.11
Sodium chloride,	"	"	0.29
Silica,	"	"	1.13
Sulphuric acid,	"	"	1.37
Total	"	"	67.57

Buffalo Lithia Springs, Mecklenberg County. W. P. Toury, analyst.

No. 1. *Alkaline Calcic, Acidulated.*

Calcium bicarbonate,	grains	per gallon	39.28
Lithium bicarbonate,	"	"	1.48
Iron bicarbonate,	"	"	0.50
Calcium sulphate,	"	"	19.25
Magnesium sulphate,	"	"	1.53
Potassium sulphate,	"	"	0.46
Aluminium sulphate,	"	"	8.18
Sodium chloride,	"	"	1.26
Silica,	"	"	1.72
Iodine, phosphoric acid, and organic matter			traces.
Total grains per gallon			73.66

Gases.

Carbonic acid,	cubic	inches	69.01
Sulphuretted hydrogen,	"	"	5.09

No. 2. *Calcareous, Lithia.*

Calcium bicarbonate,	grains	per gallon	14.96
Potassium carbonate,	"	"	29.30
Lithium bicarbonate,	"	"	2.25
Barium bicarbonate,	"	"	1.75
Iron bicarbonate,	"	"	0.30
Calcium sulphate,	"	"	33.07
Magnesium sulphate,	"	"	0.89

Aluminium sulphate,	grains per gallon	9.07
Sodium chloride,	" "	4.92
Silica,	" "	1.87
Iodine, phosphoric acid, and organic matter		traces.
Total grains per gallon		98.38

Gases.

Carbonic acid,	cubic inches	59.2
Sulphuretted hydrogen,	" "	8.3

No. 3. *Chalybeate Acidulated.*

Calcium carbonate,	grains per gallon	2.52
Potassium carbonate,	" "	1.85
Iron bicarbonate,	" "	3.77
Calcium sulphate,	" "	2.35
Magnesium sulphate,	" "	0.15
Aluminium sulphate,	" "	3.04
Sodium chloride,	" "	0.22
Silica,	" "	0.57
Lithia, phosphoric acid, and organic matter		traces.
Total grains per gallon		14.47

Gases.

Carbonic acid,	cubic inches	11.06
Sulphuretted hydrogen,	" "	3.04

Wolf Trap "Lithia" Springs, Halifax County. M. B. Hardin, analyst.

Alkaline.

Sodium carbonate,	grains per gallon	0.24
Calcium carbonate,	" "	7.41
Magnesium carbonate,	" "	5.09
Lithium carbonate,	" "	0.02
Strontium carbonate,	" "	0.39
Manganese carbonate,	" "	0.01
Iron carbonate,	" "	0.06
Potassium sulphate,	" "	0.06
Sodium sulphate,	" "	0.06
Sodium nitrate,	" "	5.63
Aluminium phosphate,	" "	0.04

Sodium chloride, grains per gallon	0.63
Sodium bromide, " "	0.01
Silica, " "	2.02
Ammonium carbonate, barium carbonate, zinc carbonate, copper carbonate, magnesium bicarbonate, calcium fluoride, titanic oxide, and organic matter	traces.
Total grains per gallon	20.67

Gases.

Oxygen, cubic inches	4.70
Nitrogen, " "	3.60
Carbon dioxide, " "	12.38

Elkington Lithia Springs, Rockingham County. M. M. Hardin, analyst.

Alkaline.

Calcium bicarbonate, grains per gallon	3.60
Magnesium carbonate, " "	2.56
Potassium carbonate, " "	0.15
Lithium bicarbonate, " "	0.04
Iron carbonate, " "	0.12
Potassium sulphate, " "	0.19
Manganese carbonate, " "	0.01
Sodium carbonate, " "	0.19
Aluminium phosphate, " "	0.02
Sodium chloride, " "	0.01
Silica, " "	0.85
Cobalt carbonate, sodium bromide, sodium iodide, sodium borate, arsenic trioxide, titanium dioxide, ammonium nitrate, calcium fluoride, and organic matter	traces.
Total grains per gallon	7.75

Gases.

Carbonic acid, cubic inches	20.01
Oxygen, " "	1.92
Nitrogen, " "	4.21

Farmville Lithia Springs, Farmville, Prince Edward County, 150 miles from Norfolk, *via* Norfolk and Western Railroad. E. T. Fristoe, analyst.

Acidulated.

Calcium bicarbonate, grains per gallon	1.33
Magnesium bicarbonate, " "	4.49
Lithium carbonate, " "	1.99
Ferrous carbonate, " "	1.26
Sodium sulphate, " "	3.59
Calcium sulphate, " "	1.81
Potassium sulphate, " "	0.18
Sodium chloride, " "	5.30
Alumina, " "	2.52
Silica, " "	3.92
Manganous carbonate, iodine, sulphuric acid, and organic matter	traces.
Total grains per gallon	26.39

Gases.

Carbonic acid, cubic inches	74.2

Fauquier White Sulphur Springs, Fauquier County. Thomas Antisell, analyst.

Alkaline.

Calcium bicarbonate, grains per gallon	7.88
Magnesium bicarbonate, " "	2.47
Calcium sulphate, " "	3.39
Potassium sulphate, " "	1.63
Iron sulphate, " "	2.14
Sodium chloride, " "	3.75
Calcium and magnesium sulphate, " "	0.64
Organic matter, " "	0.10
Total " "	22.00

Gases.

Carbonic acid, cubic inches	11.00
Sulphuretted hydrogen, " "	little.

Jordan Alum Springs, Rockbridge County. William E. A. Aiken, analyst.



No. 1.

Sodium sulphate,	grains	per gallon	0.17
Calcium sulphate,	"	"	4.44
Magnesium sulphate,	"	"	5.18
Potassium sulphate,	"	"	1.31
Aluminium sulphate,	"	"	25.38
Iron sulphate,	"	"	18.54
Iron phosphate,	"	"	0.25
Sodium silicate,	"	"	2.51
Ammonium crenate,	"	"	0.53
Iron crenate,	"	"	0.68
Sodium chloride,	"	"	0.73
Sodium iodide,	"	"	0.70
Sulphuric acid,	"	"	23.64
Organic matter,	"	"	0.58
Total	"	"	84.64

Gases.

Carbonic acid, cubic inches	6.16

No. 2.

Sodium sulphate,	grains	per gallon	0.25
Calcium sulphate,	"	"	0.32
Magnesium sulphate,	"	"	3.15
Potassium sulphate,	"	"	0.32

Aluminium sulphate, grains per gallon	11.20
Manganese sulphate, " "	0.12
Iron sulphate, " "	1.43
Iron protosulphate, " "	0.30
Nickel sulphate, " "	0.10
Cobalt sulphate, " "	0.08
Copper sulphate, " "	0.12
Zinc sulphate, " "	0.07
Sodium chloride, " "	0.01
Silica, " "	2.00
Sulphuric acid, " "	2.07
Lithium sulphate, cadmium sulphate, calcium phosphate, calcium fluoride, organic matter	traces.
Total grains per gallon	21.54

Gases.

Carbonic, cubic inches	11.22
Oxygen, " "	1.33
Nitrogen, " "	3.76

No. 3.

Sodium sulphate, grains per gallon	0.19
Calcium sulphate, " "	0.29
Magnesium sulphate, " "	2.65
Potassium sulphate, " "	0.29
Aluminium sulphate, " "	6.88
Manganese sulphate, " "	0.30
Iron sulphate, " "	1.84
Iron protosulphate, " "	0.23
Nickel sulphate, " "	0.13
Cobalt sulphate, " "	0.09
Copper sulphate, " "	0.11
Zinc sulphate, " "	0.03
Sodium chloride, " "	0.01
Silica, " "	2.80
Sulphuric acid, " "	2.14
Lithium sulphate, cadmium sulphate, calcium phosphate, calcium fluoride, organic matter	traces.
Total grains per gallon	17.94

Gases.

Carbonic acid, cubic inches	11.39
Oxygen, " "	1.27
Nitrogen, " "	3.62

No. 4.

Sodium sulphate, grains per gallon	0.23
Calcium sulphate, " "	3.31
Lithium sulphate, " "	0.02
Magnesium sulphate, " "	9 22
Potassium sulphate, " "	0.27
Aluminium sulphate, " "	81.05
Manganese sulphate, " "	1.02
Iron protosulphate, " "	0.52
Iron persulphate, " "	5.17
Nickel sulphate, " "	0.06
Cobalt sulphate, " "	0.32
Copper sulphate, " "	6.08
Zinc sulphate, " "	0.61
Cadmium sulphate, " "	0.03
Calcium phosphate, " "	0.01
Sodium chloride, " "	0.08
Silica, " "	3.03
Sulphuric acid, " "	4.84
Calcium fluoride, organic matter	traces.
Total grains per gallon	116.27

Gases.

Carbonic acid, cubic inches	10.38
Oxygen, " "	1.11
Nitrogen, " "	3.19

No. 5.

Sodium sulphate, grains per gallon	0.32
Calcium sulphate, " "	3.01
Lithium sulphate, " "	0.01
Magnesium sulphate, " "	5.37
Potassium sulphate, " "	0.30
Aluminium sulphate, " "	26.11

Manganese sulphate,	grains	per gallon	0.57
Iron protosulphate,	"	"	0.22
Iron persulphate,	"	"	2.46
Nickel sulphate,	"	"	0 26
Cobalt sulphate,	"	"	0.31
Copper sulphate,	"	"	2.33
Zinc sulphate,	"	"	0.22
Calcium phosphate,	"	"	0.01
Sodium chloride,	"	"	0.06
Silica,	"	"	3.30
Sulphuric acid,	"	"	7.90
Cadmium sulphate, calcium fluoride, organic matter			traces.
Total grains per gallon			52.73

Gases.

Carbonic acid,	cubic inches		9.91
Oxygen,	"	"	1.35
Nitrogen,	"	"	3.33

No. 6.

Sodium sulphate,	grains	per gallon	0.24
Calcium sulphate,	"	"	1.84
Lithium sulphate,	"	"	0.01
Magnesium sulphate,	"	"	8.21
Potassium sulphate,	"	"	0.33
Aluminium sulphate,	"	"	27.85
Manganese sulphate,	"	"	0.53
Iron protosulphate,	"	"	0.32
Iron persulphate,	"	"	2.87
Nickel sulphate,	"	"	0.41
Cobalt sulphate,	"	"	0.31
Copper sulphate,	"	"	3.10
Zinc sulphate,	"	"	0.28
Cadmium sulphate,	"	"	0.01
Calcium phosphate,			trace.
Sodium chloride,	"	"	0.04
Calcium fluoride,			trace.
Silica,	"	"	3.42

Sulphuric acid,	grains per gallon	5.32
Organic matter,		trace.
Total	" "	55.09

Gases.

Carbonic acid,	cubic inches	11.08
Oxygen,	" "	1.62
Nitrogen,	" "	4.04

Chalybeate Spring, at Jordan Alum Springs, Rockbridge County. J. W. Mallet, analyst.

Magnesium carbonate,	grains per gallon	0.74
Manganese carbonate,	" "	0.04
Iron carbonate,	" "	0.70
Sodium sulphate,	" "	0.14
Calcium sulphate,	" "	3.71
Potassium sulphate,	" "	0.13
Calcium phosphate,	" "	0.02
Sodium chloride,	" "	0.11
Sodium iodide,	" "	0.01
Alumina,	" "	0.05
Silica,	" "	0.72
Organic matter,	" "	0.09
Total	" "	6.46

Gases.

Carbonic acid,	cubic inches	5.60
Oxygen,	" "	1.60
Nitrogen,	" "	8.56

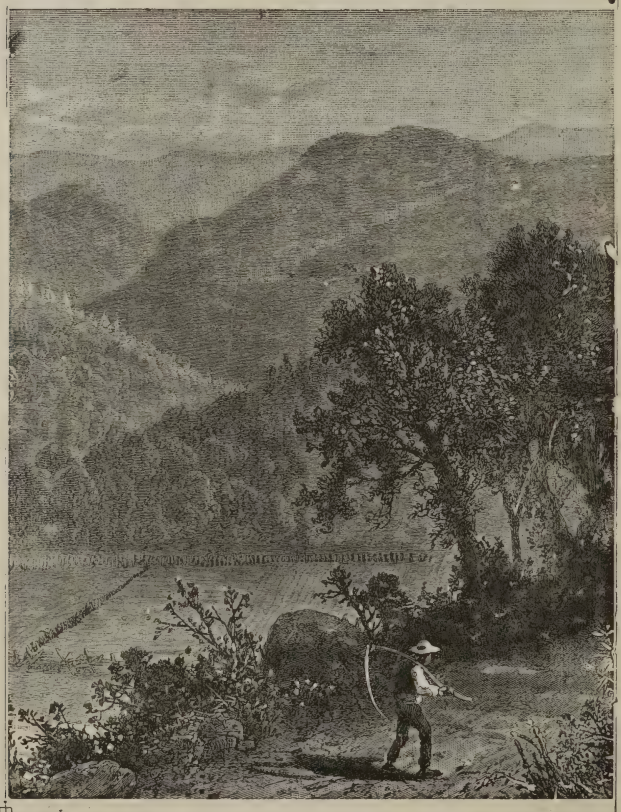
Cold Sulphur Springs, Rockbridge County.

Saline.

Calcium bicarbonate,	grains per gallon	1.84
Magnesium carbonate,	" "	1.78
Iron carbonate,	" "	0.02
Sodium sulphate,	" "	2.46
Calcium sulphate,	" "	2.91
Magnesium sulphate,	" "	0.29
Aluminium sulphate,	" "	0.25
Sodium silicate,	" "	1.48
Calcium chloride,	" "	0.12

Organic matter, grains per gallon	0.32
Phosphates,	trace.
Total " "	14.47

Rawley Springs, Rockingham County, Main Fountain. J. W. Mallet, analyst.



PICTURESQUE B. & O.—VIRGINIA VALLEY.

Chalybeate, Acidulated.

Soda, grains per gallon	0.31
Magnesia, " "	0.39

Potash,	grains per gallon	0.07
Lime,	" "	0.35
Lithia,		trace.
Ammonia,		trace.
Iron peroxide,	" "	1.32
Manganese protoxide,	" "	0.01
Alumina,	" "	0.05
Silica,	" "	0.82
Chlorine,	" "	0.03
Sulphuric acid,	" "	0.52
Carbonic acid (combined),	" "	1.56
Organic matter,	" "	0.35
Total	" "	5.78

Gases.

Carbonic acid,	cubic inches	7.24
Oxygen,	" "	2.07
Nitrogen,	" "	4.18
Carburetted hydrogen,	" "	trace.

Massannetta Mineral Spring, near Harrisonburg, Rockingham County. J. W. Mallet, analyst.

Alkaline.

Sodium carbonate,	grains per gallon	1.13
Calcium carbonate,	" "	14.78
Magnesium carbonate,	" "	6.95
Manganese carbonate,	" "	0.05
Iron carbonate,	" "	0.38
Calcium sulphate,	" "	0.42
Potassium sulphate,	" "	0.11
Potassium chloride,	" "	0.16
Ammonium chloride,	" "	0.01
Alumina,	" "	0.16
Silica,	" "	0.13
Organic matter,	" "	0.48
Lithia, arsenious oxide, and phosphoric acid		traces.
Total grains per gallon		25.76

Gases.

Carbonic acid,	cubic inches	2.64

Oxygen,	cubic inches	8.44
Carburetted hydrogen,	" "	2.25

Mineral Springs, near Farmwell Station. R. B. Riggs, analyst.

No. 1. *Alkaline.*

Calcium carbonate,	grammes per litre	0.1319
Calcium bicarbonate,	" "	0.1100
Sodium sulphate,	" "	0.2355
Calcium sulphate,	" "	1.5052
Magnesium sulphate,	" "	0.0752
Sodium chloride,	" "	0.0104
Potassium chloride,	" "	0.0067
Alumina,	" "	0.0070
Silica,	" "	0.0210
Loss,	" "	0.0040
Total	" "	2.1067

No. 2. *Alkaline.*

Calcium carbonate,	grammes per litre	0.1107
Calcium bicarbonate,	" "	0.1438
Sodium sulphate,	" "	0.2543
Calcium sulphate,	" "	1.6363
Magnesium sulphate,	" "	0.0975
Sodium chloride,	" "	0.0244
Potassium chloride,	" "	0.0057
Alumina,	" "	0.0105
Silica,	" "	0.0110
Total	" "	2.2942

Wayland Spring, Nottoway County. N. S. C. Taylor, analyst.

Indifferent.

Calcium bicarbonate,	grains per gallon	3.04
Magnesium bicarbonate,	" "	1.05
Iron bicarbonate,	" "	0.91
Total	" "	5.00

Yellow Sulphur Spring, near Christiansburg, Montgomery County. William Gilham, analyst.

Calcareous.

Calcium carbonate,	grains per gallon.....	8.64
Magnesium carbonate,	" "	1.38
Iron carbonate,	" "	0.62
Calcium sulphate,	" "	63.30
Aluminium sulphate,	" "	3.18
Magnesium sulphate,	" "	21.10
Potassium sulphate,	" "	0.10
Sodium and aluminium sulphate,	" "	0.75
Calcium phosphate,	" "	0.01
Sodium chloride,	" "	0.07
Potassium chloride,	" "	0.10
Organic matter,	" "	3.73
Total	" "	104.98

Gases.

Carbon dioxide, cubic inches.....	10.00

Kimberling Springs, Bland County. Red Sulphur Spring. D. K. Tuttle, analyst.

Alkaline.

Sodium carbonate,	grains per gallon.....	6.21
Calcium carbonate,	" "	0.12
Magnesium carbonate,	" "	1.62
Potassium carbonate,	" "	0.75
Calcium sulphate,	" "	2.32
Sodium chloride,	" "	0.42
Silica,	" "	0.67
Sulphuric acid,	" "	0.17
Iron,	.....	trace.
Organic matter,	" "	2.16
Total	" "	15.04

Alleghany Springs, Montgomery County. F. A. Genth, analyst.

Calcareous.

Calcium carbonate,	grains per gallon.....	3.61
Magnesium carbonate,	" "	0.36

Lithium carbonate,		trace.
Strontium carbonate,	grains per gallon	0.06
Barium carbonate,	" "	0.02
Manganese carbonate,	" "	0.06
Iron carbonate,	" "	0.16
Cobalt carbonate,		trace.
Zinc carbonate,		trace.
Copper carbonate,		trace.
Lead carbonate,		trace.
Sodium sulphate,	" "	1.72
Calcium sulphate,	" "	115.29
Magnesium sulphate,	" "	50.88
Potassium sulphate,	" "	3.70
Magnesium nitrate,	" "	3.22
Ammonium nitrate,	" "	0.56
Aluminium phosphate,	" "	0.03
Aluminium silicate,	" "	0.21
Sodium chloride,	" "	0.28
Calcium fluoride,	" "	0.02
Antimonium teroxide,		trace.
Silica,	" "	0.88
Crenic acid,		trace.
Apocrenic acid,		trace.
Organic matter,	" "	2.00
Total	" "	183.06

Gases.

Carbonic acid,	cubic inches	4.56
Sulphuretted hydrogen,		trace.

Clifton Springs, Alleghany County. J. L. Campbell, analyst.

No. 1. *Alkaline Chalybeate.*

Soda,	grains per gallon	0.584
Magnesia,	" "	0.325
Potash,	" "	0.153
Lime,	" "	1.226
Lithia,		trace.
Iron oxide,	" "	1.109
Manganese,		trace.

Alumina,	grains per gallon		0.076
Silica,	"	"	0.728
Chlorine,	"	"	0.052
Phosphoric acid,			trace.
Sulphuric acid,	"	"	0.721
Carbonic acid,	"	"	2.069
Organic acid,	"	"	0.422

Gases.

Carbonic acid,	cubic inches		6.013
Oxygen,	"	"	1.847
Nitrogen,	"	"	3.955

No. 2. *Alkaline Calcic.*

Soda,	grains per gallon		4.182
Magnesia,	"	"	3.202
Potash,	"	"	0.648
Lime,	"	"	21.830
Lithia,			trace.
Iron oxide,			trace.
Silica,	"	"	1.177
Chlorine,	"	"	0.765
Phosphoric acid,			trace.
Sulphuric acid,	"	"	2.236
Carbonic acid,	"	"	22.373
Organic matter,			trace.
Carbonic acid,	cubic inches		5.018

Sweet Chalybeate Springs, Alleghany County, Red Spring.

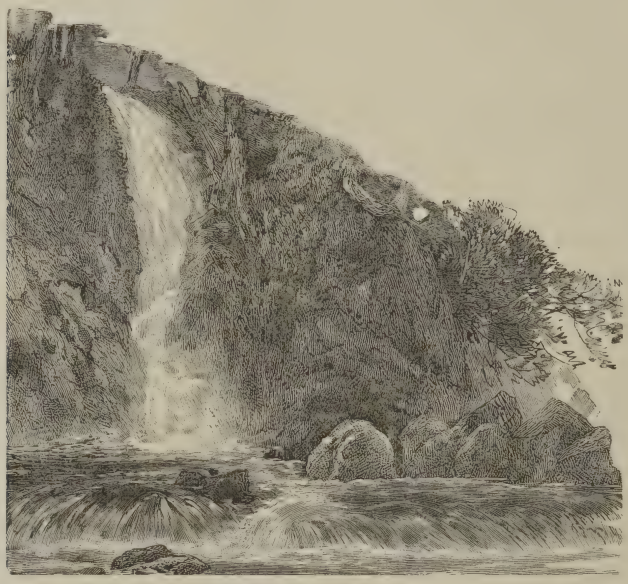
No. 1. W. B. Rogers, analyst.

Calcareous.

Calcium carbonate,	grains per gallon		2.70
Sodium sulphate,	"	"	3.23
Calcium sulphate,	"	"	32.88
Magnesium sulphate,	"	"	7.18
Sodium chloride,	"	"	0.09
Magnesium chloride,	"	"	1.57
Calcium chloride,	"	"	0.02
Iron sesquioxide,	"	"	0.73
Total	"	"	48.40

Gases.

Carbonic acid,	cubic inches	.....	46.10
Oxygen,	" "	.....	0.20
Nitrogen,	" "	.....	2.57
Sulphuretted hydrogen,		.....	trace.



No. 2. Rowelle, analyst.

Alkaline.

Calcium carbonate,	grains per gallon	.....	16.00
Magnesium carbonate,	" "	.....	12.00
Iron carbonate,	" "	.....	8.00
Magnesium sulphate,	" "	.....	4.00
Sodium chloride,	" "	.....	2.00
Iron (combined),	" "	.....	4.00
Silica,	" "	.....	4.00
Total	" "	.....	50.00

Dickson's, or Callaghan's Sulphur Spring, Alleghany County. W. B. Rogers, analyst.

Indifferent.

Sodium carbonate,	grains per gallon	.....	2.26

Calcium carbonate,	grains	per gallon	2.48
Magnesium carbonate,	"	"	1.50
Sodium chloride,	"	"	0.05
Iron peroxide,	"	"	0.03
Silica,	"	"	0.96
Potassium chloride,			trace.
Organic matter,			little.
Loss,	"	"	0.19
Total	"	"	7.47

Rockbridge Alum Springs, Rockbridge County.

No. 1. A. A. Hayes, analyst.

Calcium sulphate,	grains	per gallon	3.26
Magnesium sulphate,	"	"	1.76
Potassium sulphate,	"	"	1.76
Ammonium crenate,	"	"	0.70
Sodium chloride,	"	"	1.01
Iron oxide,	"	"	4.86
Alumina,	"	"	17.91
Silica,	"	"	2.84
Sulphuric acid,	"	"	15.22
Carbonic acid,	"	"	7.36
Total	"	"	56.68

No. 2. M. B. Hardin, analyst.

Sodium sulphate,	grains	per gallon	0.03
Calcium sulphate,	"	"	3.23
Lithium sulphate,	"	"	0.02
Magnesium sulphate,	"	"	5.61
Potassium sulphate,	"	"	0.01
Aluminium sulphate,	"	"	42.61
Manganese sulphate,	"	"	0.09
Iron persulphate,	"	"	1.95
Nickel sulphate,	"	"	0.14
Cobalt sulphate,	"	"	0.02
Zinc sulphate,	"	"	0.39
Calcium phosphate,	"	"	0.17
Sodium chloride,	"	"	0.11
Copper,	"	"	0.04

Silica,	grains per gallon		3.70
Sulphuric acid,	"	"	3.83
Total	"	"	62.35

Gases.

Oxygen,	cubic inches		1.49
Nitrogen,	"	"	3.98
Carbon dioxide,	"	"	10.89

No. 3. M. B. Hardin, analyst.

Sodium sulphate,	grains per gallon		0.02
Calcium sulphate,	"	"	2.64
Lithium sulphate,	"	"	0.02
Magnesium sulphate,	"	"	6.37
Potassium sulphate,	"	"	0.38
Manganese sulphate,	"	"	0.53
Iron persulphate,	"	"	1.76
Nickel sulphate,	"	"	0.24
Cobalt sulphate,	"	"	0.08
Zinc sulphate,	"	"	0.21
Lead sulphate,			trace.
Ammonium nitrate,			trace.
Calcium phosphate,	"	"	0.20
Sodium chloride,	"	"	0.11
Calcium fluoride,			trace.
Antimony,			trace.
Copper,	"	"	0.09
Arsenic,			trace.
Alumina,	"	"	43.95
Silica,	"	"	3.13
Sulphuric acid,	"	"	2.04
Organic matter,			trace.
Total	"	"	61.77

Gases.

Oxygen,	cubic inches		1.65
Nitrogen,	"	"	4.10
Carbon dioxide,	"	"	11.95

No. 4. A. A. Hayes, analyst.

Calcium sulphate,	grains	per gallon	3.26
Magnesium sulphate,	"	"	4.42
Ammonium crenate,	"	"	1.22
Ammonium chloride,	"	"	0.44
Iron oxide,	"	"	4.69
Alumina,	"	"	24.09
Silica,	"	"	1.71
Sulphuric acid,	"	"	9.51
Carbonic acid,	"	"	4.20
Organic matter,	"	"	1.02
Total	"	"	50.58

No. 5. J. W. Mallet, analyst.

Sodium sulphate,	grains	per gallon	0.03
Calcium sulphate,	"	"	2.32
Lithium sulphate,	"	"	0.03
Magnesium sulphate,	"	"	7.36
Potassium sulphate,	"	"	0.18
Aluminium sulphate,	"	"	72.37
Manganese sulphate,	"	"	1.37
Iron persulphate,	"	"	2.90
Nickel sulphate,	"	"	0.23
Cobalt sulphate,	"	"	0.08
Zinc sulphate,	"	"	0.22
Calcium phosphate,	"	"	0.05
Sodium chloride,	"	"	0.14
Copper,	"	"	0.10
Silica,	"	"	4.38
Sulphuric acid,	"	"	3.07
Lead sulphate, ammonium nitrate, calcium fluoride, antimony, arsenic, organic matter.			traces.
Total grains per gallon.			94.83

Gases.

Oxygen,	cubic	inches	4.12
Nitrogen,	"	"	1.64
Carbon dioxide,	"	"	12.72

No. 6. J. W. Mallet, analyst.

Sodium sulphate,	grains	per gallon	0.01
Calcium sulphate,	"	"	0.35
Lithium sulphate,	"	"	0.02
Magnesium sulphate,	"	"	1.50
Calcium sulphate,	"	"	0.06
Aluminium sulphate,	"	"	19.00
Manganese sulphate,	"	"	0.52
Iron protosulphate,	"	"	0.88
Nickel sulphate,	"	"	0.05
Cobalt sulphate,	"	"	0.04
Zinc sulphate,	"	"	0.05
Sodium chloride,	"	"	0.14
Silica,	"	"	1.93
Sulphuric acid,	"	"	2.54
Iron persulphate, copper sulphate, ammonium, nitrate, calcium phosphate, calcium fluoride, organic matter..			traces.
Total grains per gallon.			27.09

No. 7. J. W. Mallet, analyst.

Sodium sulphate,	grains	per gallon	0.24
Calcium sulphate,	"	"	0.32
Magnesium sulphate,	"	"	3.15
Potassium sulphate,	"	"	0.32
Aluminium sulphate,	"	"	11.20
Manganese sulphate,	"	"	0.13
Iron protosulphate,	"	"	0.29
Iron persulphate,	"	"	1.43
Nickel sulphate,	"	"	0.10
Cobalt sulphate,	"	"	0.08
Copper sulphate,	"	"	0.12
Zinc sulphate,	"	"	0.07
Sodium chloride,	"	"	0.01
Silica,	"	"	2.01
Sulphuric acid,	"	"	2.07
Lithium sulphate, cadmium sulphate, calcium phosphate, calcium fluoride, organic matter			traces.
Total grains per gallon			21.53

Gases.

Oxygen,	cubic inches	1.33
Nitrogen,	" "	3.76
Carbon dioxide,	" "	7.22

No. 8. J. W. Mallet, analyst.

Sodium sulphate,	grains per gallon	0.18
Calcium sulphate,	" "	0.29
Lithium sulphate,	" "	0.01
Magnesium sulphate,	" "	2.65
Potassium sulphate,	" "	0.25
Aluminium sulphate,	" "	6.88
Manganese sulphate,	" "	0.31
Iron protosulphate,	" "	0 23
Iron persulphate,	" "	1.84
Nickel sulphate,	" "	0.12
Cobalt sulphate,	" "	0.09
Copper sulphate,	" "	0.11
Zinc sulphate,	" "	0.03
Sodium chloride,	" "	0.01
Silica,	" "	2.80
Sulphuric acid,	" "	14.00
Cadmium sulphate, calcium phosphate, calcium fluoride, organic matter		traces.
Total grains per gallon		17.94

Gases.

Oxygen,	cubic inches	1.27
Nitrogen,	" "	3.62
Carbon dioxide,	" "	11.39

No. 9. J. W. Mallet, analyst.

Sodium sulphate,	grains per gallon	0.23
Calcium sulphate,	" "	3.31
Lithium sulphate,	" "	0.02
Magnesium sulphate,	" "	9.22
Calcium sulphate,	" "	0.27
Aluminium sulphate,	" "	81.05
Manganese sulphate,	" "	1.03

Iron protosulphate,	grains	per gallon	0.52
Iron persulphate,	"	"	5.17
Nickel sulphate,	"	"	0.46
Cobalt sulphate,	"	"	0.31
Copper sulphate,	"	"	6.08
Zinc sulphate,	"	"	0.61
Cadmium sulphate,	"	"	0.03
Calcium phosphate,	"	"	0.01
Sodium chloride,	"	"	0.08
Silica,	"	"	3 03
Sulphuric acid,	"	"	4.84
Calcium fluoride, organic matter			traces.
Total grains per gallon			116.27

Gases.

Oxygen,	cubic	inches	1.11
Nitrogen,	"	"	3.19
Carbon dioxide,	"	"	10.38

No. 10. J. W. Mallet, analyst.

Sodium sulphate,	grains	per gallon	0.32
Calcium sulphate,	"	"	3.02
Lithium sulphate,	"	"	0.01
Magnesium sulphate,	"	"	5.36
Potassium sulphate,	"	"	0 30
Aluminium sulphate,	"	"	26.11
Manganese sulphate,	"	"	0.57
Iron protosulphate,	"	"	0.23
Iron persulphate,	"	"	2.43
Nickel sulphate,	"	"	0.26
Cobalt sulphate,	"	"	0.31
Copper sulphate,	"	"	2.33
Zinc sulphate,	"	"	0.21
Cadmium sulphate,			trace.
Calcium phosphate,	"	"	0.01
Sodium chloride,	"	"	0.06
Calcium fluoride,			trace.
Silica,	"	"	3.30

Sulphuric acid,	grains per gallon	7.90
Organic matter,		trace.
Total	" "	52.72

Gases.

Oxygen,	cubic inches	1.35
Nitrogen,	" "	3.33
Carbon dioxide,	" "	9.91
Marsh gas,		trace.

No. 11. J. W. Mallet, analyst.

Sodium sulphate,	grains per gallon	0.24
Calcium sulphate,	" "	1.84
Lithium sulphate,	" "	0.01
Magnesium sulphate,	" "	0.21
Potassium sulphate,	" "	0.33
Aluminium sulphate,	" "	27.85
Manganese sulphate,	" "	0.53
Iron protosulphate,	" "	0.32
Iron persulphate,	" "	2.87
Nickel sulphate,	" "	0.41
Cobalt sulphate,	" "	0.31
Copper sulphate,	" "	3.10
Zinc sulphate,	" "	0 28
Calcium phosphate,	" "	0.01
Sodium chloride,	" "	0.04
Silica,	" "	3.42
Sulphuric acid,	" "	5.32
Cadmium sulphate, calcium fluoride, organic matter..		traces.
Total grains per gallon		55.09

Gases.

Oxygen,	cubic inches	1.62
Hydrogen,	" "	4.04
Carbon dioxide,	" "	11.08

"Chalybeate" Spring, at Rockbridge. Alum Springs. J. W. Mallet, analyst.

Calcareous.

Magnesium carbonate,	grains	per gallon	0.89
Manganese carbonate,	"	"	0.05
Iron carbonate,	"	"	0.85
Calcium sulphate,	"	"	4.46
Potassium sulphate,	"	"	0.16
Calcium phosphate,	"	"	0.02
Sodium chloride,	"	"	0.14
Alumina,	"	"	0.06
Silica,	"	"	0.87
Organic matter,	"	"	0.11
Lithium carbonate, copper, arsenic, and nitric acid			traces.
Total grains per gallon			7.61

Pulaski Alum Springs, Dublin, Pulaski County. J. L. Campbell, analyst.

Calcium sulphate,	grains	per gallon	1.58
Magnesium sulphate,	"	"	1.87
Potassium sulphate,	"	"	0.83
Aluminium sulphate,	"	"	21.59
Iron sulphate,	"	"	108.75
Soluble silicates,	"	"	0.84
Sodium chloride,	"	"	0.56
Sulphuric acid,	"	"	1.94
Total	"	"	137.96

Bedford Alum and Iron Springs, Bedford Springs, Campbell County.

No. 1. M. B. Hardin, analyst.

Sodium sulphate,	grains	per gallon	0.87
Calcium sulphate,	"	"	4.90
Lithium sulphate,	"	"	0.24
Magnesium sulphate,	"	"	12.58
Potassium sulphate,	"	"	0.71
Aluminium sulphate,	"	"	24.18
Manganese sulphate,	"	"	0.19
Iron protosulphate,	"	"	0.59
Iron persulphate,	"	"	19.26

Nickel sulphate,	grains per gallon		0.04
Cobalt sulphate,	"	"	0.06
Copper sulphate,	"	"	0.06
Zinc sulphate,	"	"	0.07
Magnesium nitrate,	"	"	0.27
Ammonium,	"	"	0.24
Calcium phosphate,	"	"	0.30
Sodium chloride,	"	"	0.23
Calcium fluoride,			trace.
Silica,	"	"	1.69
Sulphuric acid,	"	"	4.02
Organic matter,	"	"	0.29
Total	"	"	70.88

Gases.

Oxygen,	cubic inches		1.32
Nitrogen,	"	"	3.33
Carbon dioxide,	"	"	6.98

No. 2. William Gilham, analyst.

Alkaline Sulphuretted.

Calcium sulphate,	grains per gallon		18.67
Magnesium sulphate,	"	"	12.66
Potassium sulphate,	"	"	10.16
Aluminium sulphate,	"	"	7.24
Iron protosulphate,	"	"	23.46
Sulphuric acid,	"	"	19.98
Total	"	"	92.17

Church Hill Alum Springs, Henrico County, near Richmond. J. C. Booth, analyst.

Calcareous Chalybeate.

Sodium sulphate,	grains per gallon		1.94
Calcium sulphate,	"	"	88.83
Magnesium sulphate,	"	"	86.07
Potassium sulphate,	"	"	2.44
Aluminium persulphate,	"	"	72.93
Ammonium sulphate,	"	"	0.64

Iron bisulphate,	grains per gallon	.....	83.35
Iron protosulphate,	"	"	24.18
Iron persulphate,	"	"	51.26
Sodium chloride,	"	"	4.62
Silica,	"	"	10.43
Phosphoric acid,		.....	trace.
Total	"	"	426.69

Seven Springs near Abingdon, Washington County. J. W. Mallet, analyst.

Calcareous.

Sodium sulphate,	grains per gallon	.....	0.23
Calcium sulphate,	"	"	17.54
Lithium sulphate,	"	"	0.02
Magnesium sulphate,	"	"	16.00
Potassium sulphate,	"	"	0.06
Strontium sulphate,		.....	trace.
Aluminium sulphate,	"	"	15.22
Ammonium sulphate,	"	"	0.02
Manganese sulphate,	"	"	0.26
Iron protosulphate,	"	"	0.41
Iron persulphate,	"	"	4.63
Nickel sulphate,	"	"	0.16
Cobalt sulphate,	"	"	0.01
Copper sulphate,	"	"	0.01
Zinc sulphate,	"	"	0.30
Calcium phosphate,		.....	trace.
Sodium chloride,	"	"	0.33
Calcium fluoride,		.....	trace.
Silica,	"	"	1.50
Organic matter,	"	"	0.12
Water,	"	"	42.94
Total	"	"	99.76

The Blue Ridge Springs are located near the summit of the Blue Ridge Mountains, 1300 feet above the level of the sea, in Botetourt County, about forty miles southwest of Lynchburg. Their waters are saline and calcareous. F. A. Genth, analyst.

Calcium bicarbonate,	grains per gallon	.....	5.44
Magnesium bicarbonate,	" "	.....	3.01
Iron bicarbonate,	" "	.....	0.41
Sodium sulphate,	" "	.....	0.97
Calcium sulphate,	" "	.....	100.22
Magnesium sulphate,	" "	.....	47.56
Potassium sulphate,	" "	.....	0.40
Sodium chloride,	" "	.....	0.25
Alumina,	" "	.....	0.14
Silica,	" "	.....	1.26
Total	" "	.....	159.66



NEAR ROANOKE RED SULPHUR SPRINGS (PAGE 304).

WATER FILTRATION AND CHOLERA.*

By Professor R. Koch, of Berlin.

THESE filter works had some faults even in their construction. An instrument was wanting to measure the pace of filtration and to regulate it ; badly filtered water could not be removed ; in working the filter the sand layer could be filled from below with filtered water, and the disturbance of the sand by the flow of the natural water brought to the filter could not be avoided. Yet these are faults which are found even in great filter works. They make it extraordinarily difficult to obtain good filtered water, but they do not make it impossible. Had one made use of the Nietleben filter works with the proper knowledge of a specialist, and had one examined the filtered water bacteriologically, one would have obtained, it is true, less water, but a water to which hygienically there would hardly be any objection. On the supposition that there are only two filters in full use, and that they are working on a total superficies of 82.5 square metres, there would be, if the pumping works were continuously in use (that is, twenty-four hours and not fifteen hours per day), with the pace of filtration at 100 mm. in the hour, still a daily supply of 198 cb.m. of filtered water, or nearly 200 litres per head per day. But in case of necessity one might have gone much further in diminishing the supply, for 200 litres mean a very generous water supply. I had occasion quite recently to visit another lunatic asylum which had not yet been opened, but as to which I received the official assurance that they would have to be content with a supply of 25 litres per head per day, as, even with the best intentions, more could not be obtained (it may be noticed that this institution has not to supply any steam boilers, as is the case in Nietleben). But from what we have described there can be no question as to the treatment of the filter being conducted with proper knowledge. Among those who superintended it there was obviously no one who had the faintest knowledge of how a filter

* Continued from page 246.

should be treated. The filtered water was at times chemically investigated, and it was believed that if the chemical analysis showed the water to be free from ammonia and "nitric acid," the filter work did its duty, more especially as the analyst reported that by aid of a microscope some brown and green algæ were to be found in the water, but no "cocci and bacteria" and "nothing really dangerous." A proper bacteriological investigation never once took place before the outbreak of the cholera, and yet such an investigation would have at once shown that the filters only eliminated from the water the larger objects held in suspension. And not always these, as the water in the institution was often so little clear that it was not willingly drunk by those to whom it was offered. Micro-organisms, and especially infectious matter, could by such a process be only very partially kept back. Ultimately the object in view was to force as much water as possible through the layers of the filter, and then it was impossible to work the filters according to rule, and to leave on the top of the sand the mud layer which is indispensable for filtration.

In Nietleben the fact does not appear to have been known that water must be allowed to rest at least *four and twenty hours over the sand in order to enable* the filtering mud layer to be formed, as here from the very beginning the process of filtration commenced three quarters of an hour after the water was allowed into the filter. But, nevertheless, during the filtration, after one or a few days, there was so much mud on the surface of the sand that then at least the water was properly filtered. In recent years, however, this was not the case, for the filters were only kept going about five days, and as soon as a filtering mud covering was formed, it was at once scraped off; ultimately the filtration became one only in name, and the water in reality passed through the filter unpurified. In order to prove this, Professor Pfuhl examined the water before and after the filtration. He found in the unpurified water of the Saale 302,400 germs in a cubic centimetre, and 52,410 germs in a cubic centimetre of the filtered water. If only one single bacteriological experiment of this character had been made before the breaking out of the epidemic, and proper importance had been attached to the result, the danger would not have been met so carelessly;

precautions would have been taken in time to remove the evils, and the institution would then have been preserved from a great misfortune. And there was every reason to devote the greatest attention to filtration, for, as I shall have to explain later on, the conditions in Nietleben are quite similar to those in Altona. The water which is to be filtered is seriously exposed to contamination. The Saale water flows laden with the fæcal matter of many towns and villages situated higher up the stream, and especially from Leipzig, the sewage of which is brought into the Saale by the Elster, which flows into it a mile above Nietleben. What is even more serious is that 500 paces above the intake a small dirty rivulet flows into the Saale which has the very appropriate name of Saugraben (Sow's ditch). This stream comes from the village of Nietleben there, and takes up all the filth of the town and also of several mines and factories, and immediately before flowing into the Saale it receives the drains from the sewage farm. The thick water of the Saugraben does not mix quickly with the Saale water, and flows for a long time different in color along the bank until, hardly diluted, it reaches the intake, which therefore brings to the filter works not the pure Saale water, but the water of the Saugraben, only slightly diluted. One would surely not have risked the establishment of water-works immediately below a tributary so contaminated, had there not been the fullest assurance that by careful filtration the water was purified from noxious matter, and it could certainly not have been suspected that in the way in which the water-works were used they not only gave no protection to the institution against infection, but in reality acted as a trap for infectious matter, as was unfortunately found ultimately to be the case. The course which the cholera took at Nietleben proved that the badly filtered water was the conductor of the infectious matter, and, moreover, proofs have been found of the existence of cholera bacteria in the Saale below the confluent of the Saugraben on two separate occasions ; cholera bacteria were also found in the filtered water taken from the collecting tank of filter No. 2, and even in one case in the water actually supplied to the institution.

In the water-works of Nietleben we have been made acquainted with works which in spite of certain defects would,

if properly and carefully used, still have given satisfactory results, and these defects could with slight alterations have been nearly completely removed. Now we will go on to learn, on the contrary, from the case of the Altona waterworks, that the present existing filters have faults the importance of which have so far either not been known or sufficiently appreciated, and against which even the best superintendence is of no avail.

The provincial lunatic asylum of Nietleben, some kilometres to the west of Halle, obtains its water-supply from an arm of the Saale, which is called the "Wild Saale." The water of the Wild Saale flows with a natural fall into the filtering area, and after it has passed it it is brought by means of an iron "lift pump" to the pumping station. The pumps lift it then into several elevated reservoirs, from which it is distributed. The filtering area, to which our interest is for the moment restricted, has been in use since 1883. It is in its processes completely in accordance with the filtering works erected in recent times. It consists of three covered filters constructed of masonry adjacent to each other, each having a superficial area of 41.25 square metres. The filtering material consists, as usual, of a foundation of stone on which there are layers of gravel and sand, the last of a depth of 66 cm. The river water reaches the filter not immediately, but first goes through two basins adjacent to each other, each of a superficial area of 11.25 square metres, from which it is brought by iron pipes to the upper surface of the sand layer. After the water has gone through the layers of the filter, it is collected in a canal at the foot of the filter, which is connected with three smaller tanks, the so-called "collecting tanks," on the other side of the filter. These last, being connected with each other in a way, form the pure water reservoir from which the filtered water is drawn by the lifting pump of the pump station. The filters were, according to the statement of the filter superintendent, who was officially examined, treated in the following way.

As soon as one of the filters was so covered with mud that it had to be cleansed, the in-and-out flow was stopped, and the water which was standing over the sand layer was pumped away with a hand pump till it measured only a depth of

10 cm. Thereupon the filter was again put into communication with the collecting tank which belonged to it, and the water in the collecting tank, after the communication with the lifting pump was broken, was taken away by pumps. The water which remained on the surface of the filter now sank into the filtering material, the surface of sand being thereby rendered dry. Wooden planks were then laid on the sand, and mounting upon these the cleaners removed the uppermost layer of sand to the extent to which it appeared dark and muddy. The surface of sand was again made level, and the planks which had served as a stand for the feet were removed. In order again to fill the filter the dams separating the outer basins from the filtering area were pushed open slowly, in order that the upper layer of sand might not be too much disturbed by the inflow. This, however, could not, even by a slow inflow, be avoided in that part of the filtering area which was next to the dam. The opening of the dam took about twenty minutes. About three quarters of an hour after the dam was pushed open the water in the collecting tank of the cleansed filter stood higher, as a rule, than that in the adjacent collecting tanks, and then the connection with the two other collecting tanks and the lifting pump was restored, and thereby the process of filtration put again into regular order.

Originally this filter was calculated for the 700 inmates of the institution, and it was understood that 300 litres per head should be supplied daily, and that the pumps should work for fifteen hours each day. It was necessary therefore to filter every hour 14 cubic metres of water. To perform this there were three filters, two of them with a superficies of 82.5 square metres; the third could not be brought into calculation, as, owing to the necessity of cleansing, it had to be considered as out of use. On the basis of these figures we arrive at the pace of filtration of 170 mm. in the hour.

In the first period of these works the several filters appeared capable of performing their duties for about three weeks. Very soon, even in 1884, the filtration was less good, and one was obliged every fourteen to ten days to cleanse the filters. At the same time it was discovered that the lift pump which, as we mentioned above, brings the water to the pumping

station, was not impermeable (it originally consisted of clay pipes). It took up considerable quantities of water from the subsoil in which it was fixed. In reality, therefore, the filters, working for ten to fourteen days, had even then only partly supplied the wants of the institution. The clay-pipe lift pump was replaced by an iron one, so that only filtered water from the Saale could come into the institution. At the same time the institution was considerably increased, so that the number of inmates was raised from 700 to nearly 1000. Thus the discrepancy which even at the commencement existed between the capacity of the filters and the demands made upon them became so great that, in order to obtain the amount of water which was wanted, there was nothing else to do but to make the sand layer of the filter as thin and permeable as possible. The periods of cleansing became increasingly shorter, and in the two last years (1891–92) the filter superintendent had in summer to cleanse two filters every week, and in winter all three filters each week. Filter No. 1 was cleansed every week on Monday and Tuesday; filter No. 2 on Wednesday and Thursday; filter No. 3 on Friday and Saturday; on Sunday all the three filters were working.

(*To be continued.*)

MEDICAL EXCERPT.

By T. P. Corbally, A.M., M.D.

The Equine Origin of Tetanus, earnestly advocated by Verneuil, has been criticised by M. Péan. He takes strong ground (*Le Gazette Médicale*, August 6th) against the invariable equine origin of the disease, as advocated by M. Verneuil, and against the immediate union of wounds as a means of avoiding tetanic infection; he also objected to the use of the thermo-cautery, and summed up as follows the measures which seemed to him to be the most efficacious to limit or to completely prevent the tetanus:

"1. Always, when a patient is wounded even slightly, whether it be in the city or the country, the wound should be

washed with some antiseptic lotion and covered, not with a porous dressing, as is generally done, but with an impervious substance, as collodion, diachilon plaster, and the like."

This recommendation is followed by a note, in which he says that, in consequence of this precaution, he has been able to preserve all the students who followed the course during his prosectorship from infection by anatomical punctures, and has been able since that time to preserve the numerous patients who applied at the hospitals for advice from purulent infection, and even from tetanus.

"2. To use even more care in applying antiseptic dressings to all wounds of a more serious character.

"3. Abandon thermo-cautery entirely, and substitute the bistoury for it in all cases in which the use of an instrument is necessary for the proper dressing of the wound, and be careful to search for and remove all foreign bodies.

"4. Use torsion of the vessels, when possible, instead of ligatures.

"5. Never allow the wounds to remain open, but protect them from the air during and after the dressing.

"6. Give the preference to as little dressing as possible, and avoid disturbing the wound.

"7. As far as possible render the parts in the neighborhood of the wound immovable.

"8. Isolate the patients. Isolation, which we were the first to practice, in the hospitals, having already protected the patients from other infectious diseases, such as erysipelas and putrid infection, which have now disappeared from our service in the hospitals, as is the case with tetanus."

Antikamnia in Rheumatic Gout.—Dr. C. W. Chancellor, U. S. Consul at Havre, in a note addressed to the Antikamnia Co., St. Louis, writes that after an experience of about four years with antikamnia, he was unwilling to leave the country without a supply, for it has certainly been a great boon to him in his attacks of rheumatic gout. It not only relieves promptly the pain, but it seems to give tone to the stomach, and after taking it at night, he awakes in the morning with an excellent appetite and free from headache.

In the Treatment of Insomnia, Dr. C. H. Hughes, of St. Louis, particularly recommends bromidia, a reliable combination of potassic bromide, cannabis indica, and chloral hydrate, of uniform strength, well made, and the therapeutic effect which ought to be expected from its ingredients.

Some Recent Uses of Phenacetine.—Professor Mays, in a late address before the Philadelphia Polyclinic, referred to the value of phenacetine in the treatment of asthma. He gave it in combination as follows :

℞ Phenacetine..... gr. 64
Quin. sulph..... gr. 32
Ammon. mur..... gr. 90
Pulv. caps..... gr. 4
Strychninæ sulph..... gr. 1⅛
F. capsules No. 32.
S. one capsule four times daily.

He said that in the treatment of asthma medicines should be given in the evening, since asthma is nocturnal in its attacks, and the patient should be protected at night. Dr. Hunter Robb (*Maryland Medical Journal* for May) calls attention to the value of phenacetine as a substitute for morphine in painful cases of gynecological practice.

Dr. Coit Taylor (*Medical World*, July, 1893) recommends the external use of phenacetine for rheumatism. He writes : "Rheumatic pains of the joints, pains from sprains, contusions or bruises :

℞ Phenacetine..... gr. 15 to 20
Sp. vine. rect.....
Aquæ bul. āā..... oz. 1
To be applied on cloths as hot as it can be borne.

"Or,

℞ Phenacetine..... gr. 15 to 20
Lanoline .....drachm 1

Make into an ointment and apply by manipulation.

"Apply these when indicated, and the results will be satisfactory."

MORTALITY AND MORBILITY STATISTICS.

By Harry Kent Bell, M.D.

Alabama.—Jerome Cochrane, M.D., State Health Officer, Montgomery.

Mobile, 31,076 : T. S. Scales, M.D., Health Officer, reports for the month of July a mortality of 63, of which 37 were colored, and 17 were under five years of age. The annual death-rate per 1000 was 24.24.

Zymotic diseases caused 18 deaths, and consumption, 11.

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Arkansas.—D. W. Holman, Secretary, Little Rock.

California.—J. R. Laine, M.D., Secretary, Sacramento.

San Francisco, 330,000 : J. W. Keeney, M.D., Health Officer, reports for July a mortality of 489, of which 35 were Mongolian and 134 under five years of age. The annual death-rate was 17.76 per 1000. There were 61 deaths from zymotic diseases and 63 from consumption.

Connecticut.—Professor C. A. Lindsley, M.D., Secretary, New Haven, sums up as follows :

The mortality report for July has been received from all but two towns, representing a population of 795,700.

There were 1372 deaths reported in the State during the month. This was 390 more than in June ; it was 115 less than in July, 1892, and 50 more than the average number of deaths in July for the five years preceding the present.

The death-rate was 23.0 for the large towns ; for the small towns, 15.2, and 20.6 for the whole State.

The deaths from zymotic diseases were 468, being 34.1 per cent of the total mortality.

The deaths from consumption numbered 133.

New Haven, 90,000 : Total mortality, 196. Annual death-rate per 1000, 25.4.

Hartford, 56,000 : Total mortality, 105. Annual death-rate per 1000, 21.0.

Bridgeport, 58,243 : Total mortality, 145. Annual death-rate per 1000, 29.0.

Waterbury, 38,500 : Total mortality, 87. Annual death-rate per 1000, 27.1.

DELAWARE.—E. B. Frazer, Secretary, Wilmington.

DISTRICT OF COLUMBIA, 250,000 : C. M. Hammett, M.D., Health Officer, reports for the four weeks ending August 26th a mortality of 456, of which number 210 were of colored people, and 218 were under five years of age. The annual death-rate was 20.8 per 1000. There were 157 deaths from zymotic diseases, and 33 from consumption.

FLORIDA.—Joseph Y. Porter, M.D., Secretary, Jacksonville.

The summary, as published in *Florida Health Notes* for the month of June, is as follows :

Number of counties reporting, 15 ; number of cities reporting, 2 ; total population of said counties and cities, 173,835 ; number of births reported, 144 ; number of marriages reported, 352 ; number of deaths reported, 181 ; birth-rate per 1000 per annum, 9.94 ; death-rate per 1000 per annum, 12.49 ; average age of decedents, 25.99 ; number of deaths under five years of age, 63.

ILLINOIS.—J. W. Scott, Secretary, Springfield.

Chicago, 1,575,000 : A. R. Raynolds, M.D., Commissioner, reports 2924 deaths during July, representing an annual death-rate of 21.64 per 1000.

The mortality under the age of five years was 1775. The deaths from zymotic diseases numbered 1066, and from consumption, 186.

INDIANA.—C. N. Metcalf, M.D., Secretary, Indianapolis.

IOWA.—J. F. Kennedy, M.D., Secretary, Des Moines, reports in the *Monthly Bulletin* for the month of July :

Council Bluffs, 35,000 : Total deaths, 29. Annual death-rate, 7.56 per 1000.

Des Moines, 70,000 : Total deaths, 62. Annual death-rate, 9.6 per 1000.

Davenport, 35,500 : Total deaths, 28. Annual death-rate, 9.36 per 1000.

Dubuque, 40,000 : Total deaths, 33. Annual death-rate, 9.9 per 1000.

KANSAS.—M. O'Brien, M.D., Secretary, Topeka.

KENTUCKY.—J. N. McCormack, M.D., Secretary, Bowling Green.

LOUISIANA.—L. F. Salomon, M.D., Secretary, New Orleans.

New Orleans, 254,000 — 184,500 white, 69,500 colored. There were reported for four weeks ending August 26th, 449 deaths, of which number 146 were among the colored people, and 116 of children under five years of age. There were 75 deaths due to zymotic diseases, and 72 to consumption. The annual death-rate was 23.05 per 1000.

MAINE.—A. G. Young, M.D., Secretary, Augusta.

MARYLAND.—James A. Steuart, M.D., Secretary, Baltimore.

Baltimore, 455,427 : J F. McShane, M.D., Commissioner.

The total deaths during August were 836—a decrease of 109 compared with the corresponding month of August, 1892. Of these, 649 were whites and 187 colored—a death-rate of 20.54 per 1000 for the former, and 31.65 per 1000 for the latter. The death-rate per 1000 for the whole population was 22.04. Thirteen died from infectious diseases, 79 from consumption, 23 from pneumonia, 14 from bronchitis, 97 from cholera-infantum, 7 from cholera morbus, 30 from diarrhœa, 11 from dysentery, 36 from entero-colitis, 14 from gastritis, and 18 from enteritis. Three hundred and eighty-seven, or 46.30 per cent of the total deaths, were in children under five years of age.

During the month 61 cases of infectious diseases were reported—a decrease of 32 compared with the preceding month.

MASSACHUSETTS.—S. W. Abbott, M.D., Secretary, Boston.

Boston, 469,647 : S. H. Durgin, M.D., Chairman.

There were 1001 deaths reported in July, of which number

429 were under five years of age. The annual death-rate per 1000 was 24.64. There were 261 deaths from zymotic diseases, and 112 from consumption.

MICHIGAN.—Henry B. Baker, M.D., Secretary, Lansing.

For the month of August, 1893, compared with the preceding month, the reports indicate that dysentery, cholera infantum, cholera morbus, inflammation of bowels, and diarrhœa increased, and that inflammation of kidney decreased in prevalence.

Compared with the preceding month, the prevailing direction of the wind was southeast (instead of southwest), the velocity was less, the temperature was lower, the rainfall at Lansing was .25 of an inch less, the absolute and the relative humidity were less, the day and the night ozone were much more, and the height of ground above the water in the well at Lansing was three inches more.

Compared with the average for the month of August in the seven years 1886–92, inflammation of bowels was more prevalent, and intermittent-fever, dysentery, remittent-fever, inflammation of kidney, and consumption were less prevalent in August, 1893.

For the month of August, 1893, compared with the average for corresponding months in the seven years 1886–92, the prevailing direction of the wind was southeast (instead of westerly), the velocity was less, the temperature was higher, the rainfall at Lansing was 2.16 inches less, the absolute and the relative humidity were less, the day and the night ozone were slightly less, and the height of ground above the water in the well at Lansing was six inches less.

Including reports by regular observers and others, typhoid-fever was reported present in the month of August, 1893, at eighty-one places; diphtheria, eighty; scarlet-fever, seventy-six, and measles at twenty-six places.

Reports from all sources show typhoid-fever reported at forty-seven places more; diphtheria at eleven places more; scarlet-fever at three places more, and measles at eighteen places less than in the preceding month.

MINNESOTA.—C. N. Hewitt, M.D., Secretary, Red Wing.

From the third biennial report on vital statistics for the years 1890 and 1891 we quote the following :

Mortality, 1890, 14,506 ; 1891, 14,761 : miasmatic diseases, 1890, 2082 ; 1891, 2288 : diarrhœal diseases, 1890, 1243 ; 1891, 1237 : constitutional diseases, 1890, 1947 ; 1891, 1940 : developmental diseases, 1890, 2303 ; 1891, 2308 : nervous diseases, 1890, 1375 ; 1891, 1433 : respiratory system, 1890, 1421 ; 1891, 1497 : digestive system, 1890, 677 ; 1891, 685 : circulatory system, 1890, 518 ; 1891, 431.

The population of the State in 1890 was 1,301,826.

There are a number of valuable and interesting statistical tables, and among them those showing the following averages for five years, 1887–91 :

Measles caused 1.18 per cent of all deaths, and 13.1 in 100,000 population. Diphtheria caused 5.6 per cent of all deaths, and 62 in 100,000 population. Scarlatina caused 1.46 per cent of all deaths, and 16.1 in 100,000 population. Croup caused 1.62 per cent of all deaths, and 17.9 in 100,000 population. Typhoid-fever caused 4.04 per cent of all deaths, and 44.6 in 100,000 population. Diarrhœal diseases of children caused 7.75 per cent of all deaths, and 85.7 in 100,000 population. Tubercular diseases caused 9.67 per cent of all deaths, and 107 in 100,000 population. Bronchitis caused 2.35 per cent of all deaths, and 26 in 100,000 population. Pneumonia caused 5.87 per cent of all deaths, and 65.1 in 100,000 population.

The death-rate for the five years 1887–91 was 8.50 per 1000 inhabitants.

During the month of May there were 848 deaths reported —an annual death-rate of 7.82 per 1000. Diphtheria and croup caused 21 deaths ; tuberculosis, 78 ; pneumonia, 21 ; enteric-fever, 36 ; diarrhœal diseases of children, 186.

St. Paul, 155,000 : H. F. Hoyt, M.D., Commissioner, reports for the month of July a total mortality of 179, of which 121 were under five years of age. The death-rate per 1000 was 13.86. The number of deaths from zymotic diseases was 76 ; from consumption, 6.

Minneapolis, 223,700 : E. S. Kelley, M.D., Commissioner.

During the month of July, 1893, there were 256 deaths, representing an annual death-rate of 11.44 per 1000. Zymotic

diseases caused 87 deaths, and consumption, 24. There were 73 deaths under five years of age.

MISSISSIPPI.—Wirt Johnson, M.D., Secretary, Jackson.

MISSOURI.—R. C. Atkinson, M.D., Secretary, St. Louis.

Kansas City, 132,716: E. R. Lewis, M.D., Sanitary Superintendent, reports for July a mortality numbering 168, of which 88 were under five years of age, and representing an annual death-rate of 13.44 per 1000. Zymotic diseases caused 51 deaths, and consumption, 20.

St. Louis, 520,000: G. Homan, M.D., Commissioner, reports for August 857 deaths, of which number 336 were under five years of age. The annual death-rate was 19.7 per 1000. There were 267 deaths from zymotic diseases, and 68 from consumption.

NEBRASKA.—F. D. Haldeman, M.D., Secretary, Ord.

NEW HAMPSHIRE.—Irving A. Watson, M.D., Secretary, Concord.

NEW JERSEY.—Ezra M. Hunt, M.D., Secretary, Trenton.

Hudson County, 301,298: C. J. Rooney, Clerk, reports for July 600 deaths, of which 345 were under five years of age. Annual death-rate, 28.3 per 1000.

From zymotic diseases there were 175 deaths, and from consumption, 44.

Paterson, 90,251: J. L. Leal, M.D., reports for August 174 deaths, of which number 94 were under five years of age. The annual death-rate was 21.5. There were 75 deaths from zymotic diseases, and 20 from consumption.

NEW YORK.—Lewis Balch, M.D., Secretary, Albany, reports in the *Monthly Bulletin* as follows:

July is invariably the month of largest mortality in this State—10.65 per cent of the deaths of the past eight years having occurred in July. There was an average daily mortality this month of 398, having risen from 291 in June, which was the lowest rate for the year; in July, 1892, it was, however, 437. From zymotic diseases, with the exception of diarrhœa, there were fewer deaths than in June (872 to 944).

The deaths from diarrhœal diseases have increased since last month from 478, which was a small number for June, to 3200, which is 26 per cent of the total mortality ; this is less than it was last year, and less than the average, which is about 28 per cent. The infant mortality is correspondingly diminished, 50.5 per cent of the deaths having occurred under the age of five years, the average for July being 51.5. In the large cities of New York, Brooklyn, and Buffalo 40 per cent of the deaths were from diarrhœa ; in the rural parts of the State but 7.3 per cent of the deaths were from this cause. Scarlet-fever and measles continue to decrease in all parts of the State. Diphtheria is slightly more prevalent than is usual for this season. There were 16 deaths from small-pox, of which 3 occurred in Yonkers and 11 in the hospital for contagious diseases at Flatbush ; no spread of the disease is reported from a case developing at Newton's Corners, in Hamilton County, nor in Sing Sing. There is a large increase over last month in deaths reported from diseases of the digestive and nervous systems, which is customary in July. The reported deaths give a death-rate for the month of 22.75, against 17.50 in June. The temperature for the month has not varied from the normal of 71° ; there were more fair days than in June, and the rainfall was less than the average throughout the State by nearly two inches, the mean humidity being 69 per cent (73 per cent in June). The prevailing wind has been generally southwest.

New York, 1,860,803 : Total deaths, 4725—2796 under five years. Death-rate, 29.87. Zymotic diseases per 1000 deaths from all causes, 377.85. Deaths from consumption, 393.

Brooklyn, 978,394 : Total deaths, 2459—1514 under five years. Death-rate, 29.57. Zymotic diseases per 1000 deaths from all causes, 376.42. Deaths from consumption, 196.

Syracuse, 91,944 : Total deaths, 168—82 under five years. Death-rate, 21.92. Zymotic diseases per 1000 deaths from all causes, 381.40. From consumption, 17.

Albany, 98,000 : Total deaths, 176—67 under five years. Death-rate, 21.55. Zymotic diseases per 1000 deaths from all causes, 193.20. From consumption, 26.

Buffalo, 300,000 : Total deaths, 666—428 under five years. Death-rate, 26.64. Zymotic diseases per 1000 deaths from all causes, 424.45. From consumption, 36.

Rochester, 150,000 : Total deaths, 234—115 under five years. Death-rate, 18.72. Zymotic diseases per 1000 deaths from all causes, 329.06. From consumption, 24.

NORTH CAROLINA.—Richard H. Lewis, M.D., Secretary, Raleigh.

From the *Bulletin* of the North Carolina Board of Health we find that during July there were 230 deaths in 27 towns, aggregating 132,124 population ; 122 were of colored people, and 89 were of children under five years of age.

The annual death-rates were 15.0 per 1000 for the white population, 27.8 for the colored population, and 20.9 for the total. There were 23 deaths from consumption, 26 from typhoid-fever, 14 from malarial fevers, and 46 from diarrhœal diseases.

Asheville, 10,500 : Total deaths, 14. Annual death-rate, 16.0 per 1000.

Charlotte, 14,000 : Total deaths, 21. Annual death-rate, 18.0 per 1000.

Raleigh, 15,000 : Total deaths, 27. Annual death-rate, 21.6 per 1000.

Wilmington, 22,000 : Total deaths, 43. Annual death-rate, 23.5 per 1000.

NORTH DAKOTA.—F. H. DeVaux, M.D., Superintendent, Valley City.

OHIO.—C. O. Probst, M.D., Secretary, Columbus.

The *Monthly Sanitary Record* furnished the following report for the month of June : One hundred and seven cities, towns, and villages, having an aggregate population of 1,308,842, returned 1723 deaths, of which number 473 were under five years of age. The annual death-rate was 13.77 per 1000. Zymotic diseases caused 328 deaths, and consumption, 211.

Cincinnati, 325,000 : J. W. Prendergast, M.D., Health Officer, reports for August 442 deaths, of which 179 were under five years of age. Annual death-rate per 1000, 16.32. There were 102 deaths from zymotic diseases, and 43 from consumption.

Mansfield, 15,000 : R. H. Reed, M.D., Health Officer, reports for August 9 deaths, of which 1 was under five years of age.

The annual death-rate was 9.6 per 1000.

OKLAHOMA TERRITORY.—J. O. Overton, M.D., Secretary, Kingfisher.

PENNSYLVANIA.—Benjamin Lee, M.D., Secretary, Philadelphia.

Philadelphia, 1,115,562 : M. Veale, Health Officer, reports : In the four weeks ending August 26th, 1893, there were 1785 deaths, of which number 833 were under five years of age. Annual death-rate, 16.68 per 1000. Deaths from consumption numbered 173, and from zymotic diseases, 475.

Pittsburg, 255,000 : J. Guy McCandless, M.D., Registrar, reports : During the four weeks ending August 26th, 1893, there were 495 deaths, of which 286 were under five years of age. Annual death-rate, 26.61 per 1000. Zymotic diseases caused 179 deaths, and consumption, 23.

RHODE ISLAND.—C. H. Fisher, M.D., Secretary, Providence.

SOUTH CAROLINA.—H. D. Frazer, M.D., Secretary, Charleston.

SOUTH DAKOTA.—C. B. Alford, M.D., President, Huron.

TENNESSEE.—J. Berrien Lindsley, M.D., Secretary, Nashville.

The principal diseases, named in the order of their great prevalence, in the State, for the month of July, were : Dysentery, malarial-fever, diarrhœa, typhoid-fever, cholera infantum, whooping-cough, consumption, diphtheria, cholera morbus, pneumonia, tonsilitis, scarlet-fever, and mumps.

Typhoid-fever was reported in the counties of Anderson, Bradley, Cocke, Davidson, Giles, Hamilton, Henry, Knox, Lincoln, Maury, McMinn, Montgomery, Moore, Robertson, Rutherford, Shelby, and Williamson. Consumption in Anderson, Cannon, Davidson, Hamilton, Henry, Knox, Maury, Montgomery, Moore, Rutherford, Shelby, and Weakley. Whooping-cough in Cheatham, Davidson, Dickson, Houston, Humphreys, Maury, and Perry. Diphtheria in Davidson,

Knox, McMinn, and Shelby. Scarlet-fever in Gibson, McMinn, and Shelby. Mumps in Decatur and Gibson.

Chattanooga, 27,000 white and 13,000 colored : Total deaths, 37—22 of which were colored, and 14 under five years of age. Annual death-rates, 6.6 for the white population, and 20.30 for the colored, per 1000.

Memphis, 33,800 white and 27,700 colored : Total deaths, 122—75 of which were colored, and 41 under five years of age. Annual death-rates, 16.68 white, and 32.49 colored, per 1000.

Knoxville, 31,273 white and 9112 colored : Total deaths, 78—28 of which were colored, and 47 under five years of age. Annual death-rates, 19.7 white, and 36.84 colored, per 1000.

Nashville, 54,595 white, 33,159 colored : Total deaths, 143—76 of which were colored, and 47 under five years of age. Annual death-rates, 14.72 white, and 27.49 colored, per 1000.

WASHINGTON.—G. S. Armstrong, M.D., Secretary, Olympia.

WEST VIRGINIA.—N. D. Baker, Secretary, Martinsburg.

WISCONSIN.—J. T. Reeve, M.D., Appleton.

Milwaukee, 250,000 : U. O. B. Wingate, M.D., Commissioner, reports for the month of August 537 deaths, of which 377 were under five years of age. Annual death-rate per 1000, 24.78. From zymotic diseases there were 447 deaths, and from consumption, 26.

PROVINCIAL BOARD OF HEALTH OF ONTARIO.—Peter H. Bryce, M.D., Secretary, Toronto.

PROVINCE OF QUEBEC.—Elzear Pelletier, M.D., Secretary, Montreal.

BUENOS AYRES, 567,408 : Albert B. Martinez, Director-General of Municipal Statistics.

There were 1296 deaths during June, of which number 587 were under five years of age.

From epidemic diseases there were 113 deaths ; from meningitis, 53 ; from bronchitis, 50 ; from pneumonia, 145, and from consumption, 88.

PESTILENTIAL CONDITIONS.*

By A. N. Bell, A.M., M.D.

Modern sanitation, as undertaken in England fifty-five years ago, was based upon the recognition of the relation of local conditions to the death-rate of the people; and the coincidence of its practice and the progressive reduction of the death-rate ever since is the unanswerable argument for the establishment of sanitary methods everywhere. Indeed, the scientific investigation of preventive medicine essentially depends upon the registration of the causes of death. The year 1838 was the first complete registration of births, marriages, and deaths, including the registration of the diseases which were the causes of death in England. It was the beginning of the sanitary movement in that country. Hitherto it had been the almost universal practice there, as elsewhere, that when and wherever a pestilential disease broke out in a community, to attribute it to a foreign source. During the most devastating epidemic of which we have any reliable history that ever prevailed—that which swept through Europe and Northern Asia about the middle of the fourteenth century—the people were content and even encouraged to live without regard to personal cleanliness; to dwell in unventilated houses, on swampy ground bestrewn with putrescible material of all kinds; and to consume tainted food and drink foul water, while the communities severally berated one another and instituted quarantines for protection from pestilences which they all alike cultivated. "Plague" had been universally identified with Egypt up to that period, as it was for several centuries thereafter; and, though not always of the same type, it was scarcely less common in England and in several European countries than it was in Egypt.

The descriptions of the pestilential condition of London, by Erasmus, early in the sixteenth century, and of Cairo, by Volney, nearly two centuries later, are here incorporated as illustrative examples of conditions whose record should never

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* Read in Section on Hygiene, Demography and Climatology, Pan-American Medical Congress, Washington, D.C., September 8th, 1893.

be lost, and which may well be held up as object lessons to some communities in the present generation. Erasmus, of Holland, during a temporary residence in London, wrote to Dr. Francis, the physician of Cardinal Woolsey, Henry VIII.'s minister, as follows :

" I often wonder, and not without concern, whence it comes to pass that England for so many years hath been continually afflicted with pestilence, and, above all, with the *sweating sickness*, which seems in a manner peculiar to the country. We read of a city which was delivered of a plague of long continuance by altering the buildings according to the advice of a certain philosopher.

" I am much mistaken if England, by the same method, might not find a cure. First of all, they are totally regardless concerning the aspect of their doors and windows to the east, north, etc.; then they build their chambers so as not to admit a thorough air, which yet, in Galen's opinion, is very necessary. They glaze a great part of the sides with small panes, designed to admit the light and exclude the wind ; but these windows are full of chinks, through which enters a percolated air, which, stagnating in the room, is more noxious than the wind.

" As to the floors, *they are usually made of clay covered with rushes* that grew in fens, which are so slightly removed now and then that the lower part remains sometimes *for twenty years together*, and in it a collection of spittle, vomit, urine of dogs and men, beer, scraps of fish, and other filthiness not to be named. Hence upon change of weather a vapor is exhaled very pernicious in my opinion to the human body. Add to this that England is not only surrounded by the sea, but in many parts is fenny, and intersected with streams of brackish water ; and that salt fish is the common and favorite food of the poor. I am persuaded that the island would be far more healthy, if the use of these rushes were quite laid aside and the chambers so built as to let in the air on two or three sides with such glass windows as might be either thrown quite open, or kept quite shut, without small crevices to let in the wind ; for as it is useful sometimes to admit a free air, so it is sometimes to exclude it. The common people laugh at a man who complains that he is affected by the changeable and

cloudy weather; but for my part, for these thirty years past, if I ever entered into a room which had been uninhabited for some months, immediately I grew feverish. It would also be of great benefit if the lower people could be persuaded to eat less of their salt fish, and if public officers were appointed to see that the streets were kept free from mud, and—and that not only in the city, but in the suburbs. You will smile, perhaps, and think that my time lies upon my hands, since I employ it in such speculations, but I have great affection for a country which received me so hospitably for a considerable time, and I shall be glad to end the remainder of my days in it if it be possible.

"Though I know you to be far better skilled in these things than I pretend to be, yet I could not forbear from giving you my thoughts, that, if we are both of a mind, you may propose the p oject to men in authority, since even princes have not thought such regulations to be beneath their inspection." *

Though England was at that period among the most advanced of civilized nations, the admonition was of no or at most of but little avail. Some nominal "sewers" were constructed, but with a prohibition of all connection with them by house drains, or drains from water-closets or cesspools, under severe penalties. Concessions were provided for, however, as special privileges, so that if a man wished to take measures for the protection of the health of himself and family, he could do so only under special favor. Moreover, every builder built according to his own fancy, and houses continued to be "run up" without the slightest regard to drainage or decency, and under the restriction of a tax on light. That pestilential diseases continued under such conditions, and even until nearly two centuries later, to rival those of the Middle Ages in other centres of population, is perfectly consistent with the abundance of such material as they are now known to depend upon.

The description of the conditions of plague, by Volney, as witnessed by him at Cairo, in 1783, more than a century subsequent to the great plague of London, is good for all time.

The people were crowded in close, small, damp dens, thick

* Malcolm's "London," p. 459.

with the odors of their own impurities and those of the heated marshes. Their food was scanty and unwholesome, cooked over fires with dried manure for fuel. Ignorance, despotism, and poverty combined to make them in every respect a degraded people; but one good custom obtained, which the practice of better conditioned Oriental nations had communicated to them—this was the burial of their dead outside their towns. It was thus that, when the pestilence raged, he was able to count the removal of fifteen hundred corpses daily out of Cairo. The attack was accompanied by a famine, from a deficient inundation of the Nile, and the European was shocked as he passed through the streets by the dead lying here and there; and the living, who had scarcely life enough to be distinguished from the dead, imploring the passer-by for relief.*

The conditions of cholera in India at the present time, and as they seem to have been maintained from our first practical knowledge of them—gained by the commercial relations of that country with other countries which were and still are found to maintain approximate conditions—rival the conditions of the sweating sickness in London and of the plague in Cairo.

According to the official reports of Dr. M. C. Furnell, Sanitary Commissioner at Madras:

"In all India there died during 1879, 5,000,000 of people, of whom fever killed 3,500,000; cholera killed off 265,000. In some years it is much worse than this. A good deal of this mortality is preventable, and the use of impure water is, I feel persuaded, answerable for much of it.

"When the cholera was making its way down from the northwest to our presidency at the end of 1881 and commencement of 1882, I was asked by an energetic collector to send him a few simple rules on sanitation of villages, that he might publish them in his district *Gazette*. Subsequently I found myself inspecting a municipality in the north, and the manager showed me a resolution calling attention to my circular, and resolving that two important tanks, which I will call tanks A and B, should be strictly set aside for drinking purposes, and a policeman set over each to prevent people washing their bodies and clothes therein. I confess I felt very pleased and

* "Voyage en Syrie et en Egypte," vol. i., p. 175.

proud when I read this ; I felt that we were getting on. Next morning I was going round the town, when the manager pointed out in the distance a tank, which he said was the bund of tank A, one of the tanks in which washing of clothes and bodies was *strictly* prohibited. 'Oh,' I said, 'let us go and look at it.' We went. The doctor of the station and the manager of the municipality were with me. We were soon there, and it was certainly a magnificent tank. There were crowds of people at all four sides, *and all or nearly all busily engaged washing their clothes, and those that were not doing that were bathing their bodies !* The expression on the face of my friend, the manager, when he saw all this, was slightly ludicrous. Just where we had reached the tank was an old man washing a not very clean cloth, and when he had done, he washed himself and spat repeatedly in the water. He then went away, and within a minute a woman came there, stood almost in the identical spot the old man had stood a minute before, and filled two bright chatties with the water and took them home for drinking and cooking. She must of necessity have taken home some of the filth from the old man's clothes and a portion of his spittle to drink and cook with ! What a repulsive idea ! Now, what we have just seen passing under our eyes was taking place at various times of the day all round the tank, and not only all round this tank, but around the hundreds and thousands of tanks which are scattered over this fair continent of India. And this being the case, can we wonder for a moment at the rapidity with which an epidemic of cholera spreads through a community when on ceit makes its appearance in their midst ? And yet how simple is the remedy !

". . . I do not by any means maintain water is the *only* means by which cholera is spread. . . . I believe the air, clothes, food, especially drink of all sorts, besides water, may and do spread it ; *but I also believe that water is the chief means by which it is spread, especially in India, and that it is on account of the peculiar treatment water obtains in this country that India, the only country in the world, is subject to such frequently recurring and such terrible epidemics of this dread scourge.*" *

* "Cholera and Water in India" by M. C. Furnell, M.D., F.R.C.S., Companion of the Indian Empire ; Fellow of Madras University ; late Surgeon-General and Sanitary Commissioner, Madras, etc. London : J. & A. Churchill, 1887.

All the literature of good observers on cholera in India, and the leading conditions of its introduction into other countries during the ten years' interval since the report of Dr. Furnell, confirm his observations.

But besides cholera, the relation of the same conditions to other pestilential diseases should be kept in view. The report of the Madras municipality for 1891–92 affords equally striking evidence of this relation. The death-rate of the city of Madras for the year 1891 was 52.6 per 1000 of the population. Of the 23,808 deaths which occurred that year, 66 were due to small-pox, 372 to measles, 6731 to fevers, 4573 to bowel complaints, and 1916 to cholera, making a total of 13,658 from these causes, or 57 per cent of the whole ; 5843 were of infants under one year, being 437 per 1000 of the population, or 30.19 of the children born alive. The explanation of these terrible figures is given in the report as follows :

" An indifferent water-supply, defective drainage, and over a considerable portion of the municipality no drainage at all ; a porous soil loaded with organic impurity, a putrid and fluctuating subsoil water rising comparatively near the surface, want of open spaces in some parts of the town, crowded parcherries (villages) for the poor, overcrowded and ill-ventilated houses for the middle class (in many cases directly connected with the subsoil), water by wells in their interior, burial-grounds and slaughter-houses in the city, and, lastly, the general social, conjugal, and religious habits and customs of the people."

In the district of the town in which the mortality was highest, the unsanitary conditions are described as ghastly. " The first division, with a mortality of 72.8 per 1000, contains some of the largest parcherries in the municipality, with wretched huts huddled together, in some cases on a soil that, after a shower of rain, forms a slough of liquid filth." The third division, with a death-rate of 56.7, " has narrow streets of overcrowded and badly ventilated houses, most of which have wells in their interior connecting them with the subsoil water, which is here very putrid." It is in these divisions that the highest death-rate from cholera occurred.

The conditions of yellow-fever are well known to comprise a high temperature—70° F. and upward—in addition to the

conditions common to pestilential diseases. As comprising them in a concentrated degree, corresponding, more or less, with my own observations at Vera Cruz and other Mexican ports, several Central American and West Indian ports, seaports on the west coast of Africa, and at Memphis and New Orleans, in the United States, I quote a description of Havana, in 1892, by Dr. Erastus Wilson, who has been a resident of that city for a number of years.

"Havana occupies a peninsula formed by the Gulf of Mexico on the north and injutting of our bay or harbor on the east and south, terminating on that side in various lagoons and lowlands, through which several creeks meander and enter the bay in its shallow margins. Our slaughter-houses on one of these pours its blood and offal into these sloughs.

"In its topography, its streets have not been constructed to regular grades, but have followed the original surface in various altitudes. A large proportion of our streets are yet unpaved, and in the poorer wards it is a common custom to throw slop water into the streets, where it frequently forms stagnant pools that fester in the sun and exhale noxious vapors.

"A clayey subsoil underlies its surface, and its habitations, without cellars, are in direct contact with its undrained, humid soil, without damp-proof courses to protect their walls from moisture, and these are regularly saturated and discolored with it five or six feet above the ground floors.

"The city has no system of sewers, and the night soil is almost universally accumulated within the rear part of the houses in the old midden closet, which is simply a hole in the ground, mostly without lining, and consequently its bottom and sides are permeable by the filth, and which, dissolved by the house slops and other domestic waters, soaks into the ground farther and farther, until the entire foundations of the houses are reeking and pestilent with these organic infusions, undergoing putrid fermentations and exhaling their death-dealing gases and microbes within all the habitations. Moreover, these pestilential closets are usually adjoining the kitchens, and in near proximity to the sleeping apartments, which, in the houses of the poorer classes, are very imperfectly ventilated ; and it is an inveterate custom of the people

to close them persistently on the first approach of sickness, and particularly of febrile symptoms, heedless of professional advice to the contrary.

"Along the harbor side of the city, wooden wharves are built upon piles, and several of the streets that descend to the bay have, loosely constructed with flat stones or bricks and lime mortar, square drains of one foot, more or less, in size, and connecting their houses with them by similar conduits of smaller size, have set water-closets, and in this way, during many years, these conduits—by many called 'sewers'—have been accumulating deposits of sewage, less than three feet under the surface of the streets, distributing their infiltrations, and pouring out some portions of them into the bay, which accumulate as pestilential mud under the wharves.

"Thus our population, familiarized with this state of uncleanliness, are exceedingly careless in their methods of collecting their garbage, and, possessing no public urinals, all these organic materials are spread about, and our abundant rains, at certain seasons, wash them into the low belt along the harbor.

"I have copied brief mortuary statistics of some of the affections that produce the highest death-rates here, as follows:

"Out of our population of 200,000, I select the statistics of ten diseases that produced highest death-rates in Havana in 1890 and 1891, in the order of their death-rates, respectively: Pulmonary tuberculosis, 1375, 1384; lesions of heart and aorta, 633, 654; enteritis, 784, 579; pneumonia and bronchitis, 451, 429; yellow-fever, 340, 349; cerebral congestion and hemorrhage, 306, 291; meningitis, 298, 238; liver affections, 215, 197; pernicious fever, 164, 185; typhoid-fever, 223, 172; small-pox, 12, 151." *

Typhus-fever finds its conditions in dirt, privation, overcrowding, and cool or cold weather; conditions—excepting the last named—nearly identical with Oriental plague, of which disease, indeed, some observers regard it as being only a different type. "Jail-fever," "hospital-fever," "putrid-fever," and "ship-fever," are its synonyms, and each one of

* Florida State Medical Society Transactions, 1892.

these names suggests the conditions of its development, to which is added contagiousness proportional with their concentration.

It would be an easy matter to multiply quotations from the history of pestilential diseases, with which all sanitarians are familiar, and to adduce numerous examples of approximate conditions when and wherever such diseases have prevailed in the United States, as elsewhere ; particularly of the relations of a dirty soil and polluted water to the prevalence of typhoid-fever and other intestinal diseases, not considered pestilential ; but which, if estimated by their only true standard, the mortality from them in communities habitually subject to such conditions, is really more pestilential than any of the diseases against which quarantine restrictions are exercised, while the conditions which sustain them are those above all others most favorable to the introduction of cholera.

It has been observed that, in the several visitations of cholera to England, "it has generally attacked those towns and houses which offered to it the best inducements to visit them in their filth, decaying refuse, crowded and dirty population, bad water, damp, polluted subsoil, or any other of those conditions which lead to bad health in a population, and which, when cholera is absent, afford an evidence of their existence by the prevalence of scarlet-fever, small-pox, typhoid, and other fevers, measles, whooping-cough," etc.,* to which diphtheria should be added as one of the most devastating of the group.

Yet there are many communities that habitually indulge the conditions of these constantly recurring pestilential diseases, with which they have grown familiar, with never a thought apparently that the *same* conditions are a perpetual menace to the introduction or it may be the revival of the less common and exceptionally devastating pestilences. At the very time of writing this paper, my attention was arrested by a press announcement of an official report of the Governor-General of Turkestan, which has recently been published in St. Petersburg, that that province has been severely visited by an

* Douglas Galton, C.B., D.C.L., etc., *Journal of the Society of Arts*, November 19th, 1886.

epidemic of "*black death*," which followed on the footsteps of cholera. It appeared suddenly at Askabad, and in six days killed 1303 persons in a population of 30,000. "Black death" has long been known historically as a once common, deadly pestilence, which, like some other pestilences, superficial students have been wont to consider extinct. But the more attentively pestilential diseases are studied from the earliest records of them to the present time, the more evident it appears that not a single one of them has ceased to exist. The same and all exist to-day that ever have existed, and they are equally liable to occur again and again under favoring conditions.

My purpose in the foregoing quotations and interjections has been to emphasize the relation of pestilential diseases to the putrefaction of organic matter, the conditions which arrest, nourish, and propagate *bacteria*.

Every student knows that the first bacterium ever discovered was in a drop of putrid water by Leeuwenhoeck, in 1675; but it was the discovery of no new thing. In the progress of bacteriological knowledge we have learned that bacteria are essential to the putrefaction of organic matter; that the existence of bacteria, therefore, is coextensive with putrefying material in time and place from the beginning, and that wherever putrescible matter exists—on the surface of the earth, in the soil or water, or in the air—there bacteria abound.

But notwithstanding this beneficent function of bacteria, putrefaction—the process by which dead organic matter containing nitrogen is converted into food for plants—diligent investigation of their nature under divers circumstances has shown them to be, like other great tribes of plants, divisible into genera and species more or less antagonistic to each other, and that some of them are *parasites* dangerous to mankind and animals—these are the pathogenic germs of pestilential diseases—but, like the rest, they depend upon putrescible material for support and propagation. Like all living things, bacteria grow only at the expense of the food which they consume. Their viability depends more or less upon the presence of oxygen—though some can do without it—the presence or absence of moisture, the degree of temperature, the presence or absence of other agencies—antiseptics, germi-

cides, etc.—and doubtless some conditions beyond our conception. But the *spores* of bacteria—the seeds—are, of all things viable, the most persistent. Indeed, so long as they do not germinate—do not encounter congenial conditions for development—so far as time is concerned, in the absence of destructive agencies, the spores of bacteria are practically immortal. They everywhere abide putrescible, matter containing nitrogen, as their condition of development, maturity, and propagation.

Hence, however true it may be that the *adult* microbe of cholera or that of any other disease may be destroyed by desiccation, or by sprinkling with some disinfecting solution, or that it is portable only by means of moist material, and not liable to be conveyed by clothing or rags, or borne on the wings of the wind—all such conditions are void when applied to the spores.

I am aware that the cholera bacilli and some other pathogenic bacteria are devoid of spores, that they propagate exclusively by fission ; yet even these are endowed with singularly enduring qualities, depending upon favorable conditions for vegetation.

Moreover, as other vegetable organisms have their seasonal adaptations and favorable climates, so certainly have bacteria ; and so, too, their spores or seeds, like the germs or seeds of other plants, may be quickened in unusual places under exceptional seasons.

For example, typhus-fever never prevails in warm climates, nor yellow-fever in cold ; yet all observers are familiar with the occasional occurrence of these diseases contrary to their habitats. Typhoid-fever is well known to be a late summer and autumnal disease in temperate climates, yet the artificial climate of the dwelling often proves suitable to its development, when the germs are present. Moreover, of this disease in particular, like cholera, foul water is very far from being the only means of its distribution. The dust of dried excreta is ever liable to be carried in the air, to lodge in food or drink, and to be swallowed ; and, with regard to the viability of the germ in the soil, Dr. S. Monckton Copeman cites the following case :

" A man who had acquired enteric-fever elsewhere brought

it to a village. His evacuations were buried in the dung heap. Some weeks later five persons engaged in removing some of the dung were attacked by the disease; their discharges were sunk deep in the heap. At the end of nine months it was completely cleared out by two workmen, one of whom fell ill of enteric-fever and died." *

Enormous numbers of bacteria have been found in the soil by various observers. Infusions made from manural field and garden earth, even though diluted a hundred times or more, still contain thousands of bacteria in every drop; and the soil and dust of streets always contain large numbers.

Naegeli and Buckner demonstrated several years ago that the porous soil of the earth will yield germs existing in it to ascending currents of the air even when wet; which fact has a strong bearing upon the significance of the soil in the spreading of infectious diseases generally.†

"Beumer, in experimental researches for bacteria in the soil, in 1886, obtained from a specimen of sandy humus taken from the depth of three metres, 45,000,000 to the gramme; at four metres, 10,000,000; at six metres, 5,000,000. These specimens were obtained from the vicinity of hospitals at Greifswald. In a church-yard, at a depth of four metres, the number in one experiment was 1,152,000, and in another, 1,278,000. . . .*"

Frankel also has given special attention to the examination of undisturbed soil not in the immediate vicinity of dwellings:

"The most important fact developed by Frankel's researches is that in virgin soil there is a dividing line at a depth of from three quarters to one and one half metres, below which very few bacteria are found, and that consequently the 'ground-water region' is free from micro-organisms, or nearly so, notwithstanding the immense numbers present."* But neither of these investigators say anything about the kind of bacteria they found.

"Manfredi has recently (1892) published the results of his extended investigations relating to the dust in the streets of Naples. The number of bacteria varied greatly in different parts of the city. In streets where the traffic was least and

* "Treatise on Hygiene," Stevenson and Murphy, vol. i., p. 334.

† *Centralblatt f. d. med. Wissenschaften*, No. 29, 1882.

hygienic conditions the best the average number was 10,000,000 per gramme. In dirty and busy thoroughfares the average was 1,000,000,000, and in certain localities the number was even five times as great as this. Injections into guinea pigs gave a positive result in 73 per cent of the animals experimented upon. Among the known pathogenic bacteria obtained in this way were the pus cocci (in eight), the bacillus tuberculosis (in three), the bacillus of malignant œdema, and the tetanus bacillus." *

According to the investigations of , in 1890 :

"The superficial strata of the earth are exceedingly rich in pathogenic germs ; at a certain depth there is a limit beyond which the number of germs rapidly diminishes, until they cease altogether.

"In the deep strata of the bacilliferous zone pathogenic species do not exist. Graucher and Deschamps have observed the arrest of the typhus bacillus at a depth of 30 centimetres. In the cultivated superficial strata there are fewer micrococci than bacilli. The bacilli exist in the soil chiefly as spores. Under this form they best resist destructive agents and remain latent for years, retaining their virulence.

"It is probable that the pathogenic bacilli germinate in the soil.

"The cholera bacilli form numerous colonies at a depth of three metres during the months from August to October ; from April to June, at a depth of two metres, there is no development, while at a depth of one and a half metres the bacillus vegetates. At least two per cent of humidity is necessary for the development of the germs. Soil rich in organic material is most favorable to this development.

"Causes of death of the pathogenic germs exist in the soil. The principal cause is desiccation. Koch and Duclaux have demonstrated that this is especially hurtful to the micrococci, and here, according to Koch, is the explanation of the fact that micrococci are relatively rare on the superficies of the soil. The cholera bacillus dies rapidly under exsiccation. Netter fixes three weeks as the extreme limit at which the exsiccated pneumococcus preserves its virulence.

* "Manual of Bacteriology," by George M. Sternberg, Colonel and Surgeon U. S. Army, etc., pp. 570, 571.

"The two most potent causes of destruction which the microbes encounter are the saprophytic bacilli and solar light.

"The saprophytic bacilli are in continual strife with the pathogenic microbes, and have generally the advantage. The bacillus of tetanus is exceptional, and may develop favorably in the presence of other species.

"Solar light is injurious to very many bacilli. According to Duclaux, it is the most universal means of sanitation, and the most economical and potent to which public or private hygiene can have recourse.

"The turning up of the soil liberates pathogenic germs, but when the soil is not disturbed for a long time a colossal germination frequently goes on. Exhumation frees the bacteria long latent in the soil; hence the epidemics that follow the turning up of the ground.

"Pathogenic germs leave the earth in many ways to attack men and animals.

"The soil which adheres to the body, to the feet of animals, and that which is carried by insects disseminates pathogenic germs. Currents of air transport superficial dust and so propagate the spores which resist exsiccation. Water also carries germs.

"Ordinarily subterranean waters are on a level with the bacteriological zone. Sometimes the zone is exposed by fissures or by openings made in the earth. The walls of a well are a prolongation of the superficies, and are favorable to the life of germs." *

The practical application of this summary is local sanitation. The more precise knowledge, acquired during recent years, of the specific entities of preventable diseases; of the part played by earth, air, and water in their dissemination; and of their essential dependence upon putrescible matter for their reception and growth should not fail to stimulate sanitary effort everywhere against the conditions of their existence.

* *La Revista Internationale d'Igiene*, of Naples, February, 1890.

EDITOR'S TABLE.

SANITARIAN, OCTOBER NUMBER, 1893.

☞ ALL correspondence and exchanges and all publications for review should be addressed to the Editor, DR. A. N. BELL, Brooklyn, N. Y.

THE PAN-AMERICAN MEDICAL CONGRESS, held at Washington, D. C., September 5th–8th, 1893, was one of the most thoroughly organized and, consequently, one of the most successful conventions of physicians ever held in the United States.

The moving spirit of the Congress from beginning to end was the indefatigable Secretary-General, Dr. C. A. L. REED, of Cincinnati ; but the effective work of the local committees, by their skilfully devised plans for securing the largest amount of time practicable for scientific work and yet sufficient, besides, to partake of the bountiful entertainments which they provided, exhibited a like spirit.

The general sessions were held in Albaugh's Opera House. At the first session the Third Artillery Band occupied the orchestra and discoursed enjoyable music while the Congress was assembling and between the introductory and welcoming addresses.

Dr. WILLIAM PEPPER, of Philadelphia, President, and other officers of the Congress entered a few minutes after ten o'clock, and soon thereafter President CLEVELAND and Bishop PARET. President PEPPER at once called the Congress to order, and announced that the Rt. Rev. WILLIAM PARET, Bishop of Maryland, would invoke the blessing of God upon their deliberations.

Dr. PEPPER rose again and said :

" It is in accordance with the part taken by the Government of the United States in calling this Congress together that our honored President has kindly come this morning to open the proceedings."

President CLEVELAND then came forward and said :

" The part assigned me on this occasion admits of few words. It, however, affords me the opportunity to say how

pleased I am to be in any way related to an assemblage such as this, called together in furtherance of the highest and noblest purposes and desires. I hope I may also be permitted to add that the protection of the public health and the prevention of contagious diseases are objects properly brought under consideration at the capital of a nation which appreciates fully the serious importance of everything which aids in making intercourse between civilized countries and commerce between them safe and easy.

"It is also fitting that those who devote themselves to saving human life and to the alleviation of human suffering should consider the modes of reaching these beneficent ends at the seat of a government whose greatest regard is the welfare and happiness of the individual citizen. It only remains for me to declare that the Pan-American Medical Congress is now open for the transaction of the business which has called it together."

J. W. ROSS, President of the District Board of Commissioners, delivered the formal address of welcome.

President PEPPER described the scope of the Congress and the ends which it was hoped to attain.

Representative MCCREARY, of Kentucky, Chairman of the House Committee on Foreign Relations, told of the unanimity with which Congress seconded the efforts of the physicians of the United States to secure the first Pan-American Medical Congress in Washington.

Then followed introductions of and brief addresses by several foreign delegates, and representatives of some of the most important medical and sanitary organizations in the United States.

The session adjourned at one o'clock. The sections convened at three o'clock on the first day, but subsequently at eleven to one, and at three; and the general sessions were held from nine to eleven.

The total registration of the Congress numbered about twelve hundred, comprising delegates of almost every American nationality, North and South, from the West Indies, several from England and Europe, and one from Egypt. And all appeared to be intent upon such an intercommunication of knowledge for the prevention and cure of disease,

from their widely different view points, as would be of most practical benefit to all. The Congress closed shortly after twelve o'clock on Friday, with a cordial reciprocation of congratulatory speeches, hearty expressions of its appreciation of the efforts of the several committees, physicians and citizens of Washington, who had done so much to render it successful and agreeable.

Of the work done in the sections, the most that THE SANITARIAN can undertake to report is that of the Section on Hygiene and Climatology.

Surgeon-General WYMAN, U. S. Marine Hospital Service, being unable to be present, on account of extraordinary official duties, the Section on Marine Hygiene and Quarantine, of which he was chairman, was consolidated with the Section on Hygiene, Climatology, and Demography, A. L. GIHON, Medical Director U. S. Navy, Chairman.

Dr. GIHON, in his address at the opening of the section, contrasted the present conditions for conserving health in the navy with those which prevailed when he entered the service nearly forty years ago.

Speaking of the impending incursion of cholera into this country, Dr. GIHON declared that the precautions had been taken too late. The health of a nation involves international co-operation, because no State line is epidemic-proof, therefore every government should have a department in the hands of trained and competent medical men to care for health at all times.

The spasmodic precautions against epidemics from abroad was an instance of magnifying the motes on the horizon while we close our eyes to the beams that are in them. Comparatively speaking, said he, cholera kills but one man where more familiar but equally deadly diseases, such as tuberculosis, kills thousands. Hygiene in steamships, railways, and street cars was imperatively needed.

The speaker told of a trip he took South with a number of consumptives, which filled him with more fear than epidemics of yellow-fever, cholera, and diphtheria which he had gone through. The possibilities of contracting blood diseases from contact with diseased persons or their belongings were appalling. For a person who will thus conceal and disseminate a

virulent disease Dr. GIHON recommends punishment for misdemeanor.

The systems of garbage collection and street-cleaning at present in vogue in most of our cities was severely criticised by the speaker. The graceful, sweeping trains of the ladies, too, would disclose a collection of dirt and bacteria which would astonish and shock the fair wearers.

The sanitary inspector, said he, was destined to become the most important functionary of future civic government. His work would not be merely perfunctory, but deliberate and complete, for upon him would depend the public safety.

The tide of immigration into this country he compared to a filthy river pouring its flood into a lake which has no outlet. When the stream was small the contamination was not noticeable, but now it was only a matter of time when the whole lake would take on the tinge of the pollution. What the result would be no one could tell.

Dr. COMEGYS, of Cincinnati, presented a paper on the "Proper Status of the Medical Profession in the Government of the Nation," which supplemented the address of Dr. GIHON, with whom he agreed as to the importance of the medical profession being recognized by the Government. He supported this proposition by the adage, "The health of the people is the supreme law," and quoted from ancient history to show how the conservators of health had been honored by the State. But medical men desired this recognition, not on account of the empty honor, but in order to give direction and authority to their concerted efforts toward the preservation of the public health.

In this connection he read extracts from a bill presented to Congress for the establishment of a Department of Public Health, the secretary to rank as a Cabinet officer.

Dr. WILLIAM B. ATKINSON, of Philadelphia, offered a resolution endorsing the proposition of Dr. COMEGYS to establish a Department and Secretary of Public Health for the United States, and recommending the same for adoption by the Congress. After considerable discussion, the following was accepted and adopted as a substitute, and was subsequently adopted by the Congress:

"That in the opinion of the Section on Hygiene, Climatology, and Demography of the Pan-American Medical Congress, the interests of the public health in every country should be and must be intrusted to a department of the Government especially charged with their administration, and that while the precise form of administration may be left to legislation, the indispensable requisites are that it shall be national, that it shall have parity of voice and influence in the national councils, that it shall have independent executive authority, under the limitations common to other departments, and that it shall be intrusted to educated and experienced medical men, who alone are competent to assume its responsibilities.

The papers presented and discussed in the section on the second day were as follows: "The Climate of Jamaica," by JAMES CECIL PHILLIPPO, M.D., of Kingston, which will be published entire in our November number; "The Climate of Egypt," by Dr. GRANT (Bey), of Cairo, which comprised prehistoric times, and the relations of the climate to the different changes which the geological structure of Egypt has undergone during and from the past ages to the present time, exhibiting much diligent investigation.

Dr. LICEAGO, President of the National Board of Health of Mexico, read a paper on "The General Basis which Should Govern the Continent of America in Formulating a General and Efficacious International Maritime Policy." He classified all vessels as infected, suspected, or safe, and suggested appropriate treatment for each.

The afternoon session was opened by Dr. HOMAN, Health Commissioner of St. Louis, with a paper on "The Sanitary Precautions in St. Louis." In addition to the usual force of sanitary and food inspectors, the St. Louis Health Department details an additional force in summer, when the putrefaction of fruits and animal matter is more rapid. A novel feature of the St. Louis system is the photographing of unsanitary districts, the plates serving as valuable evidence in prosecution of the owners for maintaining nuisances. Another scheme which is being experimented with is a line of street railway ambulances for the speedy conveyance of the indigent sick and victims of accidents to the hospitals.

St. Louis suffers from the smoke nuisance incident to the use of soft coal and turbid water. But nearly all the old

surface wells have been condemned, and new water-works are in progress.

Dr. ORVANOS, of the Supreme Board of Health of the city of Mexico, read in Spanish a paper on "The Spreading of Pneumonia." Dr. ORVANOS showed that certain virulent forms were infectious, and urged that precautions should be taken to prevent the spread of this disease, which has usually been considered as dangerous only to the individual suffering from it.

Dr. RAUCH offered a resolution to the effect that all immigration should be suspended, both for sanitary and economic reasons, from all ports in which cholera prevails. After considerable discussion a committee of three, consisting of Drs. SHAKESPEARE, of Philadelphia, EDSON, of New York, and LEE, of Philadelphia, was appointed to draft a substitute for Dr. RAUCH'S resolution, which was adopted as follows :

Resolved, That it is the sentiment of this Section that in view of the prevalence of Asiatic cholera in Europe at the present time and the constantly increasing number of foci of infection, immigration from European countries in which cholera exists should be temporarily suspended, as this action affords, in our opinion, the only certain means of averting a threatened invasion by the disease of the countries of the American continent.

Be it further *Resolved*, That the resolution be reported to the General Session of the Pan-American Medical Congress with a request for its adoption and speedy transmission to the executives of the several countries officially represented therein.

A resolution was also adopted recommending that Congress reprint a large edition of Dr. SHAKESPEARE'S report on cholera, which is now out of print, and that copies be distributed to the delegates from all the countries represented in the Congress, many of whom have presented requests for it.

Dr. POSTLEY, of Illinois, presented a paper on "The Need of Research in Preventive Medicine." The "ounce of prevention" theory, said he, was now almost established as a law. If vaccination was an insurance against small-pox, why would it not prevail against other diseases? Koch's experiments in the prevention of tuberculosis, tetanus, and cholera were in this line, which was being carried out by other scientists. The speaker favored co-operation and encouragement

of this line of research, for the end could not be other than beneficial.

Dr. BRICE, of Toronto, Ont., presented a paper on "The School in Relation to the Spread of Diphtheria." He showed by statistics that most of the deaths from this disease occur among school-children. This was largely because of overcrowding, insufficient ventilation, and overheating of school-rooms. Overcrowding caused a great increase in carbonic acid and used up the oxygen, depressing the system, and leaving it a prey to disease. Overheating was productive of colds, and irritation of the mucous membrane gave foothold for germs of diphtheria. The lack of moisture in the air of most school-rooms was also condemned, and altogether he emphasized the serious responsibility of the managers of public schools.

Thursday, at the morning session, Dr. J. E. MONJARAS, President of the Board of Health of San Luis Potosi, Mexico, read a paper on "The Necessity of Isolating Contagious Diseases." He would effect this by special hospitals, or, in cases of emergency, tents. Next, he took up the question of disinfection of infected clothing.

Dr. JUAN ULLOA, of Costa Rica, read a paper on "International Uniformity in Quarantine Regulations." He suggested that this section should send in a memorial to the Pan-American Congress recommending the establishment of a Pan-American International Board of Health and Hygiene, with headquarters in Washington, its object to be the dissemination of information bearing on the protection of the three Americas and the West Indies from all exotic diseases. He also recommended that the republics, being constituent members of the Pan-American Congress, should form national boards of health to co-operate with this body.

Dr. LEE, of Philadelphia, presented a paper on "Leprosy," which he deemed highly contagious; but he found many strong opponents to this theory.

Dr. BEAVEN RAKE, a physician in charge of the leper asylum on the island of Trinidad, discussed the question as to whether leprosy was contagious. Of some 2000 cases carefully investigated by him, only one was clearly proved to have been contagious.

There is a bacillus of leprosy, said he, although they are sometimes missing in cases, and their cultivation outside of the human body is very difficult. The inoculation of animals is apparently impossible, and no few inoculated human beings have developed leprosy. Therefore he doubted very much the reported spreading of the disease by vaccination.

Concerning the recent scare over the alleged increase of leprosy in the world, he quoted statistics to show that the disease was decreasing in India, Iceland, and the Northwestern States of the United States.

In Trinidad, the increase was only in proportion to the population, but in the Sandwich Islands the increase had been large, in spite of stringent laws. There was also a small focus on the Russian frontier. In conclusion, he said that the chances of communication of leprosy were even less than that of tuberculosis; therefore, if lepers were segregated, tuberculosis patients should be put to the same precautions.

(Dr. LEE'S paper will appear entire in THE SANITARIAN ere long.)

"The Distribution of Disease by the Isthmian Practice, or the Direct Responsibility of the Republic of Colombia, South America, in the Burial and Disinterment of the Dead on the Isthmus of Panama," was the subject of a paper by Dr. WOLFRED NELSON, of New York. Dr. NELSON, a former member of the Board of Health of Panama, dwelt on the dangerous practices at Panama of disinterring the dead. The Panama cemetery used for the burial of the masses is a small one, and is used year after year in burying and disinterring the dead, and thus liberating millions upon millions of germs of yellow-fever and small-pox. For forty years the practice has obtained, he said, and obtains to this day, to make way for new tenants by unburying the old ones. The isthmus is the gate to two oceans, steam carriers congregate at its port, and yellow-fever has been spread on the Pacific coast of Central and South America and Mexico from Panama.

Dr. LAWRENCE FLICK, of Philadelphia, read a paper on "The Contagiousness of Pulmonary Consumption," and introduced a resolution for its prevention which elicited a good deal of discussion and some confusion.

Dr. BELL, of Brooklyn, N. Y., urged that the first necessity

was the registration of every death from consumption, and thereupon so promptly following up and disinfecting the rooms wherein the disease was contracted, and the personal effects of the dead, that no other cases could follow. Compulsory segregation of consumptives would be cruel as well as impossible in the present state of public sentiment; therefore compulsion was out of the question. The primary reform was of the close and fetid bedrooms of the people, both high and low, which were the hotbeds of consumption, and to reach these the health authorities of every community should promptly follow up every death from it and take such action as would protect other persons.

This latter sentiment seemed to meet in the concurrence of the section, and a resolution was offered by Dr. BRICE to the effect that more general precautions against the spread of consumption and other tubercular diseases should be enforced by law.

After some discussion and amendment, the resolution was adopted in the following form:

Resolved, That it is the view of the Section on Hygiene, etc., that in view of the fact that tuberculosis causes more deaths than any other disease, that it is known to be communicable, especially to persons living in houses and shops with consumptives, that the attention of national, State, and municipal authorities be directed to the necessity for controlling the dissemination of the disease.

1. By notification by physicians and householders.
2. By regulation of the residences of the tuberculized.
3. By controlling their movements so far as possible.
4. By the establishment of hospitals and homes for the infected poor.

At the sixth and last meeting of the Section, on Friday morning, Dr. A. N. BELL read the paper on "Pestilential Conditions," printed in full on other pages of this number. The remainder of the session was taken up by a discussion on quarantine.

An "ideal quarantine," said Dr. A. N. BELL, with reference to Dr. NELSON'S paper, was, in his judgment, one that implied, on the part of those who imposed it, the maintenance of equally scrupulous cleanliness and absence of quarantinable diseases at the port of arrival to be protected, as required of

ports of departure and of the vessels and merchandise, persons and personal baggage otherwise subject to quarantine.

At the end of which the following resolutions were adopted :

Resolved by this Section, That the following resolutions be added to the resolutions already adopted and reported to the General Session relative to temporary suspension of immigration, to wit :

Resolved, That in the opinion of this Section the thorough disinfection, without discrimination, of every piece of baggage, dunnage, or article of personal effects belonging to the immigrant classes and to crews of immigrant ships, and the exaction of scrupulous cleanliness of all vessels arriving at Pan-America ports should be rigidly enforced at American ports, supplementing and enhancing the protective value of similar treatment at the ports of departure, especially at times when cholera exists in Europe, as a sanitary precaution, second only in efficiency and importance to the temporary suspension of immigration.

Resolved, That it is also the opinion of this Section that the habitual and thorough disinfection of all personal effects liable to carry contagion of immigrants to the American hemisphere, and baggage of crews of vessels carrying the immigrants from any quarter of the globe, and the exaction of scrupulous cleanliness of all vessels arriving at American ports should be enforced at all times as the most efficient means of greatly lessening the introduction into this hemisphere of the seeds of various contagious diseases, which are now and have been in the past almost constantly conveyed by the immigrant classes and distributed widely among the population of this hemisphere.

Besides the foregoing, several papers were read by title and referred for publication.

The Section throughout was remarkably well attended—from forty to sixty daily. Doubtless much of the interest in it was due to the energy of the accomplished chairman, both before and during the Congress. Indeed, he was not only energetic and careful in securing material for the Section on Hygiene, but thoroughly consistent with the subject with regard to the health and comfort of his co-workers, in that he established the headquarters of the Section at the admirably appointed

HOTEL RICHMOND. Situated in the most open and healthful section of the city, adjacent to the two principal street

car lines, in the vicinity of Jackson and Lafayette parks, the White House, and the public departments, has long been the favorite hotel of the officers of the Army and Navy and the attachés of the foreign legations, many of whom hold their apartments by the year. The accomplished proprietor, Major F. W. COLEMAN, through his hereditary characteristics—from a father celebrated for "knowing how to keep a hotel"—and his own acquirements from many years' devotion to the business, has so thoroughly learned to anticipate everything needful for the comfort of his patrons that his house is devoid of the bustle common to hotels, and is a veritable home of elegant comfort.

THE MEDICAL EDITORS' ASSOCIATION had an inspiring banquet at the Arlington on the eve of the Congress. The table was covered with flowers and palms. The Marine Band was seated in one corner of the hall, and during the dinner played popular airs.

Professor WILLIAM PEPPER sat at the head of the table, with Secretary MORTON on his right and Dr. CHARLES H. HUGHES, President of the Medical Editors' Association, onhis left.

After an exceptionally fine *menu* had been disposed of President PEPPER introduced Dr. I. N. LOVE, of St. Louis, as the toast-master of the evening. The doctor made a felicitous speech, and called upon Dr. HUGHES, who said that the Archimedean lever that has lifted this first Pan-American Medical Congress of the Western world to the mountain-top of professional appreciation was the medical press of this country. Without its unfaltering courage and fidelity the Congress would have sunk under the wake of the present financial stringency and proven a dismal failure.

President PEPPER responded to the toast "The Pan-American Medical Congress." He bore testimony to the power of the medical press, and said he looked back with pleasure on the time when he was associated with it as an editor. The medical press of this country, he believed, is largely responsible for the success of the American medical fraternity, just as Dr. REED and the daily press were responsible for the success of the first Pan-American Medical Congress. There had come a time when the great questions concerning the public

health could only be solved by an international conference of the extent and dignity of the present Congress. While the influence of the medical press was great, it was not great enough to insure the success of a hollow cause. The Pan-American Medical Congress was not a hollow cause, and the medical press of the country had done yeoman service in making it possible. The conception of this grand idea belonged to Dr. CHARLES REED, and he could not foretell the great benefits that would result. He hoped for congressional assistance to carry out any recommendations that might issue from this Congress. He also hoped for succeeding congresses, which were certain to receive acknowledgment in the highest quarters.

"The President of the United States" was responded to by Secretary MORTON, who said that for many years he had admired the judicial genius of Judge GRESHAM, and of late years had had a double opportunity of admiring his great diplomacy, but he felt when Judge GRESHAM had turned this toast over to him that he had been made a vicarious offer. The President of the United States elected ceases to be a partisan and becomes a patriot, and it gave him pleasure, he said, to testify that the President had but recently come from the hands of the medical profession as strong physically as he is courageously. As for himself, he had a soft place in his heart for the men who welcomed us all into the world, and with tender sympathy saw us out again. He remembered the time when physiology and anatomy were kept out of the schools as being unfit for the minds of the young. A reformation had come about since then. He had lived to see the time when these studies were taught in the public schools. The agricultural people had a strong desire to understand the laws of heredity, and he hoped that text-books of anatomy and physiology may be printed for the enlightenment of the common people. The President of the United States is the medical director of the body politic. He is called upon in times of great financial stringency and other times when the success of his people are jeopardized to prescribe a remedy. He has but recently recommended a change of practice in the financial body, and already the prescription has borne fruitful results. One medical body (the House of Represen-

tatives) has already adopted the prescription, and when the other body (the Senate) follows suit the pulses of renewed prosperity will throb with power and vigor.

Dr. JAMES F. HIBBARD, of Richmond, Ind., President of the American Medical Association, responded to the toast to that body, and gave a pleasing history of that organization and its usefulness to the physicians of the country.

Dr. E. E. LICIAGA, President of the Mexican Supreme Board of Health, responded to the toast "Our Foreign Guests." His speech was in Spanish, but after he had concluded, Dr. W. F. HUTCHINSON gave an English translation of it, in which Dr. LICIAGA thanked the Association for the kind consideration shown the foreign guests and spoke of the beneficial results that were sure to follow the Pan-American Medical Congress.

Mr. FRANK HATTON, editor of the Washington *Post*, responded to the toast of the "Press of the United States," and Dr. HOBART AMORY HARE responded to the "Medical Press."

Surgeon-General STERNBERG, U. S. Army, was down on the programme to respond to "The Medical Department of the United States Army," but he was called away, and Dr. WILLIAM A. HAMMOND took his place. Senator JOHN B. HENDERSON also acted as substitute for Surgeon-General TRYON, U. S. Navy, who was to speak on the "Medical Department of the United States Navy." Surgeon-General WYMAN, U. S. Marine Hospital Service, who was to respond to "Our National Health," was unexpectedly called away, and ex-Surgeon-General JOHN B. HAMILTON took his place. The last regular toast of the evening was that of the "City of Washington," to which Dr. SAMUEL S. ADAMS, Chairman of the Committee of Arrangements, responded.

Speeches were also made by Dr. GARCELON, Dr. EARNEST HART, of England, Dr. CHARLES L. REED, Dr. A. M. OWEN, and Dr. REMINGTON, of the Pharmaceutical Association. Major STOFER sang several popular songs, and Mr. THOMAS Q. SEABROOKE told funny stories.

Altogether the banquet was so thoroughly enjoyed that it adjourned barely in time for the opening of the Congress on the same morning.

THE MEDICAL EXHIBIT in connection with the Congress was profuse in medical supplies and surgical appliances admirably displayed in the Washington Light Infantry Armory Hall, in the basement of the opera house building. Many of the well-known manufacturing firms of this country and abroad were represented. The collection embraced elegant pharmaceutical preparations, surgical instruments and prepared foods.

FOR KEEPING OUT THE CHOLERA, the Rev. Dr. McConnell, of Philadelphia, is reported to have said recently: "I have been instructed by my ecclesiastical superior to use a prayer to Almighty God to avert the cholera. But cholera is a dirt disease. It is, therefore, a preventable disease. To prevent the cholera you have only to remove the dirt. If you leave the dirt you invite the cholera. This city of Philadelphia is full of filth which nobody is trying to remove. To let that filth remain and to pray God to keep away the cholera is to trifle both with the cholera and with Almighty God. While that filth is allowed to remain I refuse to offer such prayers."

THE NEW YORK WATER SUPPLY TO BE PROTECTED.—The consumers of the Croton are to be congratulated on the recent joint resolution adopted by the State and city boards of health to prohibit burial, cesspools, privy vaults, and surface filth on the Croton valley water-shed.

LITERARY NOTICES AND NOTES are unavoidably postponed to next number.

PERSONAL HONORS AND PERSONAL MENTION.

SOCIÉTÉ FRANÇAISE D'HYGIENE,
30 RUE DU DRAGON, PARIS, le 20 Mai, 1893.

À Monsieur le Docteur A. N. BELL, *Réducteur en Chef du* THE SANITARIAN, *de New York, E. U. A.:*

TRES HONORÉ COLLEGUE: Je m'empresse de vous informer que, dans sa dernière Séance générale, la Société Française

d'Hygiène vous a nommé à l'unanimité, Membre Associé Etranger.

En vous remerciant du bienveillant concours que vous prêtez à cette œuvre pleine d'avénir, nous avons l'espoir que, par votre légitime influence, vous saurez lui ménager d'honorables adhésions.

Agréez, très honoré Collègue, l'assurance de mes sentiments dévoués.

DR. DE PIETRA SANTA,
Le Secrétaire Général.

THE JOURNAL D'HYGIENE for August 3d thus acknowledges the receipt of a communication from the editor-in-chief of THE SANITARIAN :

" Our esteemed correspondents, Drs. ALBERT GIHON and A. N. BELL, have sent to the editor-in-chief of the *Journal d'Hygiène* a cordial invitation to assist at and take part in the first Pan-American Medical Congress, to be held in the city of Washington from September 5th–8th.

" At the foot of the note, signed by the Chairman of the Executive Committee and the Secretary-General, is an elegant seal, which represents in gold on a silver field the terrestrial globe, showing the two Americas with the traditional caduceus and the double serpent and an antique lamp, Pompeian in style, an image of the light of science.

" Thanks to the politeness of our friend of THE SANITARIAN, of Brooklyn, N. Y., we will be able to lay before our readers the most important of the labors of the sections on Public Hygiene, Demography, Climatology, and Hydrology.

" We have seen, then, in three months, scientific meetings in Glasgow, Edinburgh, Newcastle-on-Tyne, the Hague, Rome, and Washington, not counting those in France, at Besançon and Havre.

" What a pity we cannot sing, with Avenil, in ' La Dame Blanche,' ' Qu'il est beau de courir le monde. Ah ! quel plaisir de voyager ! ' "

THE SANITARIAN.

NOVEMBER, 1893.

NUMBER 288.

SANITARY MOTES AND BEAMS.*

OPENING ADDRESS BY THE PRESIDENT.

ALBERT L. GIHON, A.M., M.D., Medical Director, United States Navy.

"And why beholdest thou the mote that is in thy brother's eye, but considerest not the beam that is in thine own eye?" (Luke 6 : 41, 42.)

THESE words of the Teacher of Humanity, which "the beloved physician" of the first century has recorded, are an appropriate text for the opening address in the important section with whose conduct I have been charged in this Congress.

Time was—and that no long time—when Hygeia, the neglected Cinderella of the medical family, slunk unnoticed among menials; now that she graces the *salon*, her proud sisters caress her and suitors court her favor. As an old admirer of this fair mistress, whose colors I have worn through youth and manhood, I may be pardoned the personal exultation that I have lived to see her suzerain.

The ascendency of hygiene has greatened and glorified medicine, without dimming the lustre of any other branch; but though her cult is established, her mission has not ended with the recognition of her supremacy and the faithful following of her own ilk. To-day she turns to the people and their rulers, outside the medical fold, and demands the place in their councils that is hers of right. A makeshift share in the administration of the sanitary interests of the country has been grudgingly allowed, but the inexorable demands of modern enlightenment cannot be satisfied until the conservator of the public health shall sit a peer among the rulers. The Minister of

* Read before the Section in Hygiene, Climatology, and Demography of the Pan-American Medical Congress, September 5th, 1893.

War may build mighty engines for destruction and defence and muster vast armies and navies, which disease can disperse with a weapon so tiny that the eye cannot discover and no mere military expedient antagonize. The Minister of Finance may fill his treasure houses with gold and silver by the ton, which can buy human souls, honor, virtue, independence, everything but the boon of health, God's free gift to man, through which alone he can be like his own glorious image. Commerce, agriculture, manufacture, fishery, mining, and all the industrial occupations of the human race, which are now the objects of the intelligent supervision of Cabinet ministers, who are grand masters of political economy and social science, cannot thrive without vigor of human blood and brains and brawn, which are the machinery of these occupations ; yet until this decade it has not been thought that the intelligent supervision of a grand master of the divine science of medicine was necessary to preserve this vigorous health of the community, without which even these other ministers can themselves only imperfectly perform their own offices of administration.

When I entered the service of the Government of the United States as an officer in the Medical Department of the Navy, nearly forty years ago, with a minimum of experience and a maximum of enthusiasm and an exalted opinion of the dignity and responsibility of my charge, which a lifetime has only intensified, I was astounded at the total ignorement of sanitary provision then prevailing in the naval service. Medical officers were curtly reminded that their opinions and advice would be asked when desired ; their protests at acts that filled the hospitals and mortuary lists were contemptuously unheeded ; they were reproved for officiousness and punished as insubordinate ; disabled sailors and marines were discharged and their places and those of the dead were filled without regret or remorse, but with the shameless boast that "if men die we can ship others," like the Netherland commodore, some of whose crew had been killed by the careless firing of a shotted saluting gun, who accepted the apology for the accident with the nonchalant remark, "Dere are plenty more Dutchmens in Holland."

The battleships and cruisers of modern navies are not more

unlike the brigs and sloops-of-war of forty years ago, than are the cleanly, well-fed, comfortably clad and cared-for enlisted men, who go on shore daily, subscribe for newspapers, and write letters—a different race from the begrimed and degraded "shell-backs," who were ordered to their work with curses and punished with brutality for offences which neglect and ill-treatment had incited. The naval and military establishments have considered the beam in their own eyes, but civil authorities are still purblind to the necessity for organized intelligent sanitary supervision and direction, and grope for succor only under the flashlight of a pestilential visitation. The following from a recent editorial in an influential journal is pertinent: "Whether cholera has or has not made its appearance at Chester, which is practically one of the suburbs of Philadelphia, it is certain that the conditions reported to exist there are in the highest degree favorable for the introduction and spread of that disease. All accounts represent the neighborhood in which the alleged cases occurred as filthy beyond description, and occupied by a class of persons who pay no attention whatever to the laws of health or personal cleanliness. Of course, the country now has the pleasant assurance that the place is to be thoroughly cleaned and effectively quarantined; but why were not the steps necessary for the protection of the public health taken before the resulting disease, whether cholera or not, had gained such a footing that already five persons have died from it? The time to lock the stable door is before the horses housed therein are stolen, and the way to treat contagious diseases is to prevent their appearance, and not wait for them to gain a foothold and then try to stamp them out."

The Secretary-General has announced that the proceedings of this section and its congener, the Section in Marine Hygiene and Quarantine, will constitute a special feature of this Congress. It is therefore incumbent upon us before adjourning to declare very positively the opinion of the members of this section, experienced practical sanitarians from every country of the Western Hemisphere, that the interests of the public health must be intrusted to a department of the Government especially charged with their administration, with equal independent executive authority as given to other national depart-

ments. Temporizing legislation under the spur of emergencies does not befit this age. As the enlightened physician seeks to prevent his charges becoming ill, so should the guardian of the public health be able to forestall these emergencies, whose pecuniary cost, in money expended and wasted, in trade paralyzed and diverted, in labor and its wages lost by the sick and terrified and dead, in a single epidemic, exceeds that of maintaining an efficient sanitary service for the whole country for a whole year.

The fault of the medical profession has always been its lack of bold assertion of its rights; but it can no longer hesitate to declare to trade and commerce and agriculture and manufacture that the health and vigor which are essential to prosperity cannot be secured by their own unskilled, uninformed efforts. They must learn, as the military services have learned, that powerful armies and navies are the results of able and untrammelled medical departments. It is as unwise to confide the care of the national health to a financier, however astute, as to expect a postmaster-general to understandingly control a bureau of agriculture, or a fishery commissioner to best administer the affairs of the public schools, and an attorney-general to direct the mining industries. The health of a nation is a national consideration involving international co-operation. There should be no priority nor clash of sectional interests. State lines are not respected by epidemic intruders. No State barrier can be so defensive and impenetrable that the toxiferous germ cannot pass through. The precise form of administration may be left to legislation, the indispensable requisites being that it shall be national, that it shall have parity of voice and influence in the national councils, that it shall have independent executive authority under the limitations common to other departments, and that it shall be intrusted to educated and experienced medical men, who alone are competent to assume its responsibilities.*

* These propositions were unanimously adopted in the form of a resolution in these terms by the conjoined Sections in Hygiene, Climatology, and Demography, and in Marine Hygiene and Quarantine, and reported to the general session of the Congress, by which it was referred to the International Executive Committee, which returned it with its indorsement and direction that it be transmitted as the voice of the Congress to the executives of all the countries represented therein.

I have not wandered from my text in thus pleading for a national public health establishment. Spasmodic tentative provisions in emergencies are nothing but attempts to discover *motes* from abroad when the *beams* at home should first receive consideration. To parallel further and in another sense, the scientific tendency of the day is literally toward mote hunting through microscopes instead of using our human eyes upon visible abominations. The sanitarian, official or amateur, need only look about him to be appalled at the spectacle of indifference of rich and poor, high and low, to dangers far greater than any from cholera microbes, which confront them every hour, and it may be worth our while to indicate some of these beams in our own eyes, which we complacently refuse to see, while we magnify the motes on our horizon.

The preventable disease which kills more of the human race than cholera and yellow-fever together, and in its ordinarily slow process of killing lessens the productive power of a community directly by the enfeeblement of its victims and indirectly by its demands upon members of households and eleemosynary institutions for the care of these chronic invalids—tuberculosis—is tolerated with as little concern as the Mongolian exhibits for small-pox or the creole for yellow-fever and malaria. The consumptive, whose traits no professional acumen is required to recognize, frequents our crowded thoroughfares, sits beside us in unventilated street cars and at the hotel table, occupies Pullman sleeping berths, and shares the steamship state-room, wholly unrestrained and innocently ignorant that he or she may be sowing the seeds of disease among delicate women and children. Any one may verify this who uses his eyes for the purpose along the railway and coastwise steamer routes to our invalid resorts. Within a twelvemonth, on my way to Mexico by rail, I was fellow-passenger with two invalids in the advanced stage of phthisis, *en route* for San Antonio, one of whom occupied the opposite berth and the other one diagonally across the car, so that I could see and hear them coughing and expectorating, with only such attention as well-intending but unskilled relatives could render. They had no vessels for receiving their sputa, which were discharged in their pocket-handkerchiefs, to be scattered over pillows, coverlets, and blankets. They left the

car in the morning, and I saw those same berths—it is true, with change of linen sheets and pillow-cases, but with no change of blankets, mattresses, or pillows—occupied that very night by other travellers, who were thus subjected to contact with a pathogenic microbe far more tenacious of life and power of evil-doing than the dreaded cholera spirillum. One has only to sit in a crowded street-car on a winter day and watch the clouds of respiratory steam circling from the mouths and nostrils of the unclean and diseased into the mouths and nostrils of the clean and healthy, as the expiratory effort of the one corresponds with the inspiratory act of the other. The road is short but straight and sure from vomica and mucous patch to the receptive nidus in another's body. Who that has ever had forced upon him an aerial feast of cabbage, onions, garlic, alcohol, tobacco, and the gastric effluvia of an old debauchee can doubt that aqueous vapor can transport microscopic germs by the same route? Not long ago I travelled by sea from New York to Charleston, and for two nights was cabined with some twenty consumptives going to Florida. The air was chilly, and they huddled around the stoves and fearfully and fearlessly closed doors and windows, until the atmosphere became stifling and surcharged with their emanations and the dried sputa, which they ejected on every side. It was comparatively easy to escape during the day by staying on deck, and I slept with my state-room windows wide open, but the curtains, carpets, pillows, and mattresses had been saturated by I know not how many expectorating predecessors. I have visited fifty small-pox cases a day, have gone through yellow-fever wards, and stood by cholera bedsides with far less apprehension than I experienced on that trip, yet it was one taken by many thousands of people, who would have been terrified to know that there had been a case of cholera within a mile to leeward of their homes. Recall in your several experiences the instances of members of a family who have occupied the same chamber and bed with a gentle and beloved invalid aunt or sister, and those of tuberculous husbands or wives, who have become ill like them with pulmonary phthisis attributed to everything but the manifest cause.

In former years I preached a crusade against another viru-

lent communicable disease, in the interest especially of innocent and helpless women and children, and for a time I was gratified to find that husbands and fathers began to realize, from the numerous indisputable instances of innocent infection I was able to report, that syphilis might be, as it had been, contracted from combs and brushes and rough-edged drinking vessels in hotels, sleeping cars, and boarding houses, from pens, pencils, and paint brushes that had been held between diseased lips, from dirty old bank-notes, from street-venders' toys, from a lover's kiss, a stranger's caress, or a nurse's ministrations. Supported by an array of cases of infected children, young girls, and elderly men and women, the committee of the American Public Health Association, of which I was chairman, advocated the enactment of a law placing venereal disease in the category of other communicable affections, and punishing its transmission as a misdemeanor; but there were too many of the self-righteous blind to these beams in their eyes, who thought it wiser to seek to exterminate by ignoring its existence and never uttering the name of a disease that has done more harm to mankind than all the diphtheria, typhoid, small-pox, measles, and scarlet-fever which are so carefully isolated and their statistics so regularly collected and promulgated—a disease that travels with the missionary to Asia, Africa, and the Pacific, and decimates bodies faster than he can whiten souls.

I do not expect that all who have eyes will see as I do, or, having ears, hearken to what I say. The idle and perverse generation of the first century will have its following in the twentieth, and men and women will continue to do the insanitary things they ought not to do, and leave undone the sanitary precautions they ought to take, despite our warning, our imploring, our advice, or our denunciation. However benevolent and beneficent the hygienist's aim, his unappreciated, unrequited, and often unprofitable labor is enough to deter him from what has been derisively described as only an effort to procure the survival of the unfit, and thus thwart nature's own attempt to rid the world of them. He encounters another obstacle to success as aggravating as the disbelief in the necessity for his work. The authorities listen to his warnings, and then employ their own perfunctory and superficial methods

of protection. Told that absolute cleanliness is the fundamental fact of sanitation, street cleaners are set at work brushing the surface dirt into little heaps, which passing vehicles again distribute, or the winds carry into the open windows of adjacent residences. The refuse of the household is deposited in vessels on the sidewalks of crowded thoroughfares to be emptied after a time into collecting carts, from which clouds of dust envelop passers and circulate back into the houses—*living* dust, for Manfredi found an average of 761,521,000 microbes to the gramme of the street dust of Naples, from which he cultivated pus, malignant œdema, tetanus, tubercle, and septicæmia. Swarms of flies feed on the decomposing contents of exposed garbage pans and buckets, and carry their tiny germ-laden booty into the butcher shop of the poor and the kitchen of the millionaire. Who can dispute that if the hair of a Newfoundland dog could transport yellow-fever to a distant Mississippi town, and a newspaper printed in an Ohio village where small-pox was raging could fatally infect a United States consul in a foreign port where the disease did not exist; that a cloud of dust, a swarm of flies, or a single fly —as Sawtschenko, Simmonds, and Sternberg demonstrate—can disseminate cholera and become a focus of infection, which would have been impossible had ordinary care been exercised in preventing the exposure and promptly destroying the discharges and excreta of those already sick? Cities are reported clean whose sanitary inspectors have merely walked through crowded tenements, a hundred or more a day, and been satisfied with external evidences of brush and broom, leaving carpets and rugs unlifted; pieces of heavy furniture, with the fluff of years behind and beneath, unmoved; and closets, cupboards, pantries, store-rooms, attics, and cellars undisturbed. The cellars of our great cities—and I speak with personal knowledge of many in New York, Brooklyn, and Philadelphia—are greater abominations than even filthy living apartments. The New York *Herald* of August 8th, narrating the death of two children by falling from a window on the fourth floor of a tenement at 204 West Sixty-first Street, said: "To get at the bodies of her children, the frantic mother had to go through the cellar of the house. There she waded through indescribable filth, almost knee-deep, to where her

children lay, when the foul odors overcame her, and she fainted." It added: "The Sanitary Superintendent issued an order that the cellar must be cleaned out within twenty-four hours." Do you believe that it was the only one of its kind that needed cleaning? No city can be accounted clean until its ordinances require every cellar door to be widely opened to sun and air—that royal pair of germicides; every cellar to be emptied of its refuse; every cellar wall and ceiling to be scraped and whitewashed; every cellar floor to be taken up if rotted, and sprinkled with lime if uncovered—a tedious and expensive process; but effective sanitation, costly as it must need be, is cheap beside the outlay of a single epidemic. There are underground foulnesses in all our great cities of which they should be rid at any cost, as where rag-pickers and bone-gatherers collect their filthy stores, and Italian street-corner fruit-sellers keep their decomposing bananas, grapes, and oranges, till, rubbed off by dirty pocket-handkerchiefs, they are exposed for sale, glistening after their repulsive polish with impure saliva. If some mote-hunter, loath to see so huge a beam, chooses to find solace in disbelief, I might be able to shock him by declaring that I have seen the figs he munches unconcernedly flattened in their pretty boxes, in a country where syphilis reigns, by questionable thumbs moistened by equally suspicious saliva. Shall I, while revealing insanitary horrors, dare lift the sweeping train of the fair promenader, fashioned after that of women in other countries who never walk upon the streets, and show the nasty mess of spittle, excreta, mud, and dust she gathers from the sidewalks upon her white skirts and silk stockings? She will not believe me; but the bacteriologist, who scoops the mud from between the cobblestones of the streets to find it swarming with microscopic life, can gather as rich a harvest of microbes from these same dainty undergarments.

Nor are these the only beams we overlook in our search for motes. Dr. Graham, bacteriologist of Starling Medical College, in response to an official inquiry by a member of Congress, reported that he was able to obtain thirteen colonies of two kinds of bacteria from one dirty, worn bank-note, and the *Medical Record* of January 21st of this year states that a British bacteriologist discovered nineteen thousand microbes,

including those of tuberculosis, diphtheria, and scarlatina, vegetating upon a single note.

Other harborers of morbific germs are the textile fabrics employed in the furnishings of street-cars and stages, which the chairman of the Sanitary Committee of the New York Board of Health reports as "a menace to public health by reason of their continual exposure to uncleanness and infection from the clothing of diseased and filthy passengers," which, like their grimy bodies, may be foul with the sputa of diphtheria, tuberculosis, or syphilis, the desquamations of scarlatina, measles, or erysipelas, the emanations of typhus, or the alvine discharges of cholera or dysentery. A commendable league of zealous ladies, who are seeking to prevent the abominable practice of expectorating in public vehicles, induced a few car companies to display placards to the effect that "Gentlemen are requested not to spit on the floor," but these appeals, intended for beasts who were never gentlemen, were hung in inconspicuous places or covered by other notices, and the spitters continue to discharge their syphilitic and tubercular sputa on the floor mats, to be taken up on ladies' petticoats and carried to their homes. The spitter and the other beast, who voids his impure nasal secretions where it suits him, are largely responsible for the spread of influenza, for, according to Pfeiffer, the discoverer of its bacillus, "its contagium is found in the moist secretions of acute cases in the discharges from the nasal and bronchial mucous membranes."

Further detail would be out of place in an introductory address to this section. Let it suffice to point to the fragile spirillum of cholera, which we are exorcising by "bell, book, and candle," as illustrating the dreaded *motes* of my text, and to the sturdy, robust bacillus of tubercle as the *beam* we will not consider. "Cholera," says Ernest Hart, "can only be drunk and eaten. It cannot be caught and breathed;" but the tubercular mischief-maker, who finds the ever-open door of the respiratory passages his readiest approach, may also enter at any or all the orifices of the body. Among 1000 autopsies, Osler found 275 with tuberculosis; among 8873 patients in the surgical clinic at Würzburg, one seventh (1227) were tuberculous; the necroscopic statistics of Harris and others "show that one third, perhaps over one half, of

the people who live to middle age have some form of tubercular infection;" and Dr. Williams, of Johns Hopkins Hospital, estimates that tuberculosis of the female generative organs is four times more frequent than generally supposed (*Medical Record*, March 18th). Can any more obvious method of direct infection in these cases be imagined than the trailing skirts of women, gathering tubercular sputa from the pavements?

The sanitary inspector is destined to become the most important agent of future civic administration. The perfunctory burning of a pan of sulphur in a diphtheritic chamber, the sprinkling here and there of a solution of corrosive sublimate, or the substitution of the sweeter scent of thymol, pinol, or some newer "ol" for the foul odor of the privy, will not then be the tolerated limit of his interference. All that science teaches and all that intelligence can devise will be exacted of him. A sanitary inspection will be a deliberate, painstaking, critical examination of nooks and corners and their disinfection, the flooding of the lairs of microscopic motes, and the deluging of unsightly beams with those unstoppled, unpatented, inexhaustible germicides—air and sunshine.

Coincident with the approaching Eleventh International Medical Congress at Rome, and its fitting complement, there is to be an exposition of medicine and hygiene; and significant of the share accorded sanitary science in a medical congress representing the highest modern professional attainment, it will be noticed that of the *ten* classes which, in their *ensemble*, make up the exposition, *five* are exclusively hygienic—to wit: (4) plans, models, and *matériel* bearing on school management and sanitary civic organization (*riordinamento urbano*); (6) plans, models, and *matériel* for hygienic constructions; (7) apparatus and furniture for hygienic uses in the interior of common dwelling-houses and public offices on every scale; (8) *matériel*, appliances, and accommodations for the practice of personal hygiene; and (9) plans, models, and appliances for the hygiene of the working classes. Three are partly hygienic—to wit: (1) apparatus, *matériel*, and plans of buildings for scientific and technical investigation in therapeutics, biology, and hygiene; (3) articles and appurtenances requisite

in salvage service and in *assistance publique;* and (10) books, atlases, photographs, and such like recently published and having reference to the medical, biologic, and hygienic sciences.

Two only of the ten are exclusively medical and surgical—to wit: (2) apparatus, instruments, and *matériel thérapeutique* in the various departments of medicine, and (5) plans, apparatus, and furniture for the purposes of the divisional surgeon in cities. Additional to these, special classes are devoted to hydrology and balneotherapy, and to the Italian Red Cross Society, both of which are practical outcomes of sanitary endeavor.

I do not forget that climatology and demography, as well as hygiene, are within the purview of this section; but what are climatology and climatotherapy but applied hygiene, and what demography but the demonstration of the results among masses of people of sanitary or insanitary conditions? The climatologist is of necessity a hygiologist. The Materia Medica and Pharmacopœia are not his text-books. Physical geography, meteorology, hydrology, balneology are his scriptures and gospels; the vivifying light, invigorating air, and healing springs and waters his armamenta—his anodynes and hypnotics, his roborants and eutrophics, his alterants and excernents. The high professional standing of the American Climatological Association, one of the constituent bodies of the Congress of American Physicians and Surgeons, and the distinguished climatologists who are with us to-day and who are conspicuous in every international congress of hygiene, are evidences of the place in medicine of climatotherapy, the practical end of medical climatology—that broad specialty which robs so many graves of untimely victims and makes so many, heretofore without hope, able, if not to take up their beds, at least to get out of them and walk. The field of the climatologist is as broad as the habitable surface of the globe—in the high altitudes of Colorado and the Alps; in the odorous pine forests of Norway and the Carolinas; on the seashore or upon the wide waste of waters and their islet oases swept by ocean breezes.

Our American vital statistics are not yet piled high enough to form the foundation for a substantial superstructure of

demography. The great caldron in which we are mixing Celts and Saxons, Semites and Aryans, with a seasoning of syphilis, tuberculosis, and insanity, is simmering with what ultimate homogeneity can only be conjectured. When immigration was a tiny stream, however muddy and noisome, poured into a rapid river of pure water, it was soon lost in the crystal fluid ; but now that huge sewers are discharging their fœtid pestilential torrents into a placid lake that has no outlet, the lake itself becomes turbid and unclean. Already in the *culs-de-sac*, which are nearest the open mouths of these foul sewers and receive their floating scum—the prisons, reformatories, alms-houses, insane asylums, and hospitals—this filthy, debased, and diseased foreign element is ascendant, and our demographers have a simple task in representing its volume by numerical statistics. Dr. Frederick H. Wines, the distinguished compiler of this portion of the census of the United States for 1890, demonstrates by the indisputable evidence of figures that while the foreign-born constitute only 17 per centum of our total white population—in round numbers about one sixth—yet they furnish over half of all the paupers in the alms-houses of the country. It is evident that the traits of the Saxon are disappearing from our national complexion, and if the proper solution of the negro question be, as suggested by certain prominent Afro-Americans, to bleach it out by admixture, we may expect the hue of our descendants to be decidedly tawny.

The most zealous demographers of this decade are the French, who have been spurred in their statistical researches to discover the causes of the too evident depopulation of France of its native races ; but are we not again refusing to consider the beam in our own eyes in not giving heed to the operation of similar conditions in our own country? Dr. Billings announces that our birth-rate has fallen from thirty-six in one thousand inhabitants in 1880 to thirty-one in one thousand in 1890. The twenty to thirty children of our ancestors, the dozen or more of our great-grandmothers, have dwindled progressively to five or six, then to three or four, until to-day one or two or none represents the fecundity of the educated classes. *The Independent*, referring to New England Puritan life, says : " Large families abounded. Ac-

cording to Cotton Mather, one woman had twenty-two children and another twenty-three by one husband, and a third was mother to seven-and-twenty. Sir William Phipps was one of twenty-six children of the same mother. Printer Green had thirty. The Rev. John Sherman, of Watertown, had twenty-six children by two wives, the second spouse the mother of twenty. The Rev. Samuel Willard, first minister of Groton, had twenty children, being himself one of seventeen, as was Benjamin Franklin." The paragraphist who can now record the case of the woman of thirty-one at Cold Spring, who has become the mother of seventeen children in nine years, or that of the Georgia matron of twenty-five who rejoices in thirteen, has, in newspaper parlance, "a great find." The spectacle of impending maternity among our better classes is becoming more and more rare, and still more rare that of an infant nursing at its mother's breast. Only in the squalid quarters and *banlieues* of our great cities, where the English language is not spoken, among imported lazzaroni and the overflow of European ghettos, does the process of human incubation go on as God and nature intended. The laws of creation are immutable, and one has only to look beneath the disfigurement of female dress to recognize the evidences of imperfect physical development—in stooping, unsymmetrical shoulders, in meagre limbs, in narrow pelves, and flattened busts. Dr. Otis exhibited at the recent meeting of the American Climatological Association, in illustration of diametric measurements of the thorax, the profiles of a number of female chests, which were supposed to be those of little girls, until he explained that they were the contours of nubile young women in Boston normal schools, like her whom Solomon bewailed in the Song of Songs: "We have a little sister, and she hath no breasts: what shall we do for our little sister in the day when she shall be spoken for?" My friend, Dr. Robert T. Morris, of New York, has significantly called attention to the fact that 80 per centum of all Aryan American women have rudimentary clitorides, and he asks if evolution is trying to do away with this organ in the degenerative changes characteristic of highly civilized varieties of the *Homo sapiens*, of which early falling hair, decaying teeth, weak mammary glands, and badly balanced eye muscles are other exam-

ples. Is the sexual instinct losing its potency as a maternal factor? Is marriage only a social office for the display of finery on the brides and bridesmaids and the entertainment of crowds of gaping strangers? Is the virgin wife best prepared for conception by months of preliminary surexcitation and feverish anxiety, and is a fatiguing railroad journey the best prelude to an act which should lead to the inception of a human being—the incarnation of a human soul? Has the function of reproduction come to be regarded only as a bestial and undesirable concomitant of matrimony, and lactation its vulgar, indecent supplement, and is all this attributable to physical deterioration shown by the undeveloped or imprisoned *mentula muliebris* and atrophied mammæ, and how far is this the explanation of the diminished fecundity of the Aryan American woman? These are problems as interesting to our demographers as the depopulation of France, the disappearance of South Sea Islanders, the migration of Semitic and Mongolian races, and the effects of malnutrition of indigenes of Ireland and Russia.

But, gentlemen, I shall no longer trench upon time that belongs to you. I am highly gratified at your presence, and thank you most cordially for your kind attention.*

* The remainder of the address was delivered in Spanish, of which the following is a translation :

GENTLEMEN, OUR FRIENDS AND COLLEAGUES FROM ABROAD : Permit me, on the part of the members of this section from the United States of America, to tender you a most hearty welcome to our capital. Your long travel to this city bespeaks your interest in the occasion. It is no light boast that here, for the first time in its history, the medical profession of all America finds itself united in one great Congress. It was about nine years ago that a number of Canadian sanitarians claimed the right as Americans to become members of the American Public Health Association, and it was my privilege as President of that body to receive them as such. The subsequent transactions of that Association show how loyal they have been to its traditions, how zealously they have participated in its work, and with what dignity they have filled its highest offices. Two years later they carried the Association into their own territory at Toronto.

In 1890 two distinguished representatives of the Superior Council of Health of our sister republic of Mexico came to Charleston, and as Americans likewise knocked at the door of the American Public Health Association, returning the following year in such numbers and with such a hearty welcome from their Government to meet in their own capital that the invitation was accepted, and the most successful meeting of that Association—the twentieth in its history—was held in the ancient city of the Toltecs. To-day the roll of States repre-

SHALL OUR STREAMS AND LAKES BE RESERVED FOR WATER SUPPLIES OR ABANDONED TO SEWAGE POLLUTION?

THE gross sewage pollution to which many of our public water supplies are subjected gives rise to the question, Which shall take precedence, the use of our inland waters as convenient outlets for sewers or as sources of pure water supply?

In considering this question such streams or lakes as are already polluted and are not used as water supplies may be excluded, and also such others as pass through densely populated regions and are subject to contamination from street drainage and seepage from polluted soil, even though sewage should be excluded from them. There will remain lakes and streams which were taken for public water supplies when of comparative purity, but which later have actually been polluted or are threatened with pollution from the sewage of towns.

Cities whose water supplies are contaminated or threatened with contamination may be divided into two general classes: those which pollute their own supplies, and those whose supplies are polluted by other communities. The cities of the first class have only themselves to blame, and deserve no pity except in so far as the natural conditions are such that the removal of contamination or the securing of a new and pure supply involves a great financial burden, which, of course, is no excuse, as a pure water supply should take precedence of

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sented in the Advisory Council shows Illinois, Massachusetts, and Tennessee, Ontario, Quebec, and Manitoba, Guanajuato, Querétaro, and Zacatecas in one fraternal union.

What sanitarians have done in that Association, which bears the escutcheons of its three constituent countries side by side, this Congress aims to accomplish for the whole profession of medicine in the Western Hemisphere, uniting its members in one brotherhood, whatever their race or language, and whether their homes be on the frozen shores of the Arctic or the hill-sides of Tierra del Fuego, among Greenland's icy mountains, in the archipelago of the West Indies, or amid the perennial gardens of Hawaii.

Physicians and brothers from the United States of all America, welcome to this your capital, which, in that sweetest language spoken by human tongues, *pongamos á vuestra disposición.*

other improvements, and with all the possibilities of modern sanitary engineering can always be secured.

Cities which, at great expense, have secured water supplies of good quality, and gradually find the water deteriorating through sewage pollution from another city, deserve sympathy, and, as a general statement, should have recourse to legal protection.

It would be interesting to review the laws of the various States of the Union on this point, but for the present we will only touch upon the statutes of three States which seem in advance of all others in this respect. These three States—Massachusetts, New York, and Minnesota—have to a large extent turned over to their State Boards of Health the sanitary protection of their inland waters. In addition it is known that Delaware and California, and, in Canada, Ontario and Quebec, have vested in their health boards considerable authority to protect water supplies. In New York all plans for sewage disposal systems, and in Massachusetts all plans for such systems or for water-works, must be submitted to and approved by the State Board of Health. If a projected sewage disposal system promises to contaminate a stream used for a public water supply, the plans are not approved and the works cannot be built. In addition to this, the laws of Massachusetts give its State Board of Health general supervision over all inland waters, and prohibit the discharge of polluting matter in large quantities into streams used for public water supplies at points nearer than twenty miles above a water-works intake, or into any body of water used as a water supply, and entirely prohibit the discharge of human excrement into such bodies of water. This prohibition has been in force since 1878. The Connecticut and Merrimac rivers, however, are exempted from this provision.

In 1885 the Legislature of Minnesota passed an act modelled upon the Massachusetts statute of 1878. The first clause of the act is as follows :

"No sewage, drainage, or refuse or polluting matter of such kind as either by itself or in connection with other matter will corrupt or impair the quality of the water of any spring, well, pond, lake, stream, or river for domestic use, or render it injurious to health, and no human or animal excre-

ment shall be placed in or discharged into, or placed or deposited upon the ice of any pond, lake, stream, or river used as a source of water supply by any town, village, or city; nor shall any such sewage, drainage, refuse, or polluting matter or excrement be placed upon the banks of any such pond, lake, stream, or river within five miles above the point where such supply is taken, or into any feeders or the banks thereof of any such pond, lake, stream, or river."

In case of violations of the above the State Board of Health of Minnesota, after a hearing, may:

". . . order any person or corporation or municipal corporation to desist from the acts causing such pollutions, or to cleanse or purify the polluting substance in such a manner and to such a degree as shall be directed by said board before being cast or allowed to flow into the waters thereby polluted, or placed or deposited upon the ice or banks of any of the bodies of water, etc."

Aside from the New York act providing for the approval of sewage disposal plans there is one, passed in 1890, which authorizes the State Board of Health to make rules for the sanitary protection of the water supply of any city. Instead of providing, as does the Minnesota statute, that the parties causing the pollution shall stand the expense necessitated, there is a section in the New York act, as amended, the first part of which reads as follows:

"When the State Board of Health shall, for the protection of a water supply from contamination, make regulations the execution of which will require or will make necessary the construction of and maintaining of any system of sewerage, or a change thereof, in any or for any village or hamlet, whether the same be incorporated or otherwise, or the execution of which will require the providing of some public means of removal or purification of sewage, the municipality or corporation owning the water-works benefited thereby shall, at its own expense, construct and maintain such works or means for sewage disposal as shall be approved by the State Board of Health."

From the above it appears that the people of Massachusetts, New York, and Minnesota have enacted specific laws to prevent the pollution of their water supplies, Minnesota exclud-

ing all sewage, Massachusetts setting a twenty-mile limit, and New York and Massachusetts compelling all plans for sewage disposal to be submitted to their State Boards of Health, which may disapprove them if not in accord with sanitary principles. Instead of prohibiting the pollution of water supplies by a general act, New York makes necessary separate regulations for each water supply, and except for minor contaminations throws the burden of excluding or purifying sewage from existing plants upon the city benefited, a condition which has been established, it appears, by politicians, and not by sanitarians, and which, as applying to all cities which take advantage of the act, seems unjust if not grossly barbarous.

Omitting further discussion regarding who should pay for excluding sewage from a water supply, the stand taken by three of our States that it must or may be excluded cannot be too highly commended, and until something arises to indicate the contrary, our State Boards of Health seem the proper bodies to be made the guardians of our water supplies, or such streams as may hereafter be needed as supplies.

Whether, in the case of long streams, the Minnesota statute prohibiting the discharge of sewage into them is not too stringent, we will not undertake to discuss at present, further than to say that in matters of health, as of engineering, it is always best to have an ample factor of safety. And it may be added that until our knowledge of the distance to which disease germs may be carried by running streams, and of the length of their life in both running and still water, is at a more advanced stage than now, a large factor of safety is highly advisable.

The evidence is increasing from day to day that to impure water supplies are due a vast number of deaths from communicable diseases, and thus it behooves our legislators to enact laws which will place every possible safeguard about public water supplies, and, above all, to provide for intelligent supervision of them and for such experimental work as is needed to settle some of the unsolved problems relating to pure water. Meanwhile, let every one do what he can to exclude sewage from our water supplies, and to preserve the natural purity of our inland waters wherever their use for receptacles for sewage would be prejudicial to the public health. —*Engineering News, August* 31*st*, 1893.

WATER FILTRATION AND CHOLERA.*

By Professor R. Koch, of Berlin.

The Altona water-works are among the oldest in Germany. They are situated at Blankenese, 1½ miles (7 English miles) below the place where all the sewers of both the towns of Hamburg and Altona discharge themselves into the Elbe, and are on the same bank as the outfall of the sewers. The intake is subject to the tide, and the difference between high and low tide is on an average over two metres. During the ebb, the water-works receive the Elbe water of the right bank, which is much contaminated by the town sewage ; during the flood they obtain water from the returning stream, which is mixed with great quantities of less contaminated Elbe water. The difference between ebb and flow can easily be seen in the bacteriological character of the Elbe water, which shows important variations as regards the amount of germs contained in it ; in short intervals a few thousand and then again some hundred thousand germs can be found in a cubic centimetre. This is especially the case in winter, when, other circumstances being the same, the number of germs in river water would decrease considerably and equally. The pumping works are situated immediately on the bank, and they conduct the water 84.7 metres high to Baursberg, a height overlooking the steep bank of the Elbe, on which the water-works are constructed. These water-works consist of two "depositing tanks," in which the somewhat strongly mixed Elbe water loses a part of the matter held in suspension, and of eight open filters. Each filter has a superficial area of 800 square metres. From the filters the water goes to a pure water reservoir of a capacity of 3050 cubic metres, and from thence, with a natural fall, to the town. The construction of the filters is not different from that in other works.

Since the summer of the year 1890 the water has been bacteriologically investigated, but only once each week, and only samples taken out of the pure water reservoir. Until the summer of 1892, in a period, therefore, of two years, the num-

* Continued from page 343.

ber of germs in a cubic centimetre of filtered water has, with the exception of a short period in January, 1891, always remained under 100. Figures of 20 have been the rule, colonies of 50 and 70 the exception. This excellent result is undoubtedly due to the skilful and careful superintendence of the filter; and it should be noted that it was made especially a point in these water-works that the pace of filtration should not exceed 100 mm. in the hour. Generally the pace was even slower. Of special importance is also the fact that the same low numbers of germs were continuously obtained, although the natural water of the Elbe was continually changing as regards the amount of germs contained in it, and at times was quite exceptionally contaminated. This is a proof that a filter properly worked can give even with the worst material—for water more contaminated than the Elbe water at Blankenese could hardly occur elsewhere—a filtered water containing less than 100 germs in a cubic centimetre.

We can also learn from the Altona filters that disturbances in the process of filtration are at once to be seen in the results of bacteriological examination. They can also, and not rarely, be seen in the results produced by the infectious matter which is not sufficiently kept back by the filter—that is, in the occurrence of infectious diseases in the district receiving the water supply. Fortunately, there are not many infectious diseases which can be conveyed by water. With certainty we only know two, cholera and abdominal typhus* [enteric-fever]. Cholera we have only periodically, but abdominal typhus is an endemic disease and one much spread everywhere and constantly in our midst. We can suppose that our great towns are never quite free from typhus, and that in the sewers, beyond other fæcal matter, there is also that of the typhus patients, and that in it the infectious matter of abdominal typhus is contained. If now, as is usually the case, the sewage is quickly taken out of the district by sewers and not brought back by the water supply, then the abdominal typhus, in so far at least as it affects the infection by water, decreases. It need not therefore completely dis-

* Here and elsewhere the term "typhus" corresponds with enteric or typhoid-fever in English.

appear, as there are other means of spreading this disease besides water, as indeed has also been found to be the case with cholera. I might even suppose that abdominal typhus is in even a less degree dependent on water, and that it can find its way without water more easily than cholera with its exotic and really tropical infectious matter, which requires damp and warmth for its existence in a much greater degree than the typhus (enteric-fever) bacillus, which is more capable of resistance. Still even typhus, as is proved by numerous observations in recent times, can be spread by water,* and when in the district receiving the water supply there suddenly occurs a remarkable increase of cases of typhus, unconnected with each other and spread equally over the district, we have then good reason to investigate whether the epidemic is not one which is due to the water supply. And if in such a case the suspicion is confirmed by later investigations, the typhus has in a way served as an index for the defects in the water supply. Such a connection has been proved in fact in all cases in which the investigation was carried out thoroughly and without prejudice, and the prevalence of typhus in a locality will in future be a most valuable sign-post for discovering defects in the water supply.

Something of this character occurred also in Altona. The town has in the last periods of ten years had epidemics of typhus which, on account of their peculiar characteristics, awakened the suspicion that they must stand in some connection with the water supply. . . . Every year, from 1886 to 1888, a typhus epidemic developed itself in connection with a long period of frost. In 1886 a frost period in February was followed by a typhus epidemic in March. In 1887 January was the colder month, and in that year the typhus reached in February its greatest virulence. In 1888 February was again colder, and March was the month in which the typhus was the most virulent. Also in 1891 an increase of typhus in February followed a period of cold weather in January. During this last typhus epidemic the bacteriological investigations of the Altona water which have been referred to above were

* When I here say that typhus can be conducted by water I am prepared to be denounced on this account by certain people as a "water fanatic' with regard to abdominal typhus.

available. From these one could see that, shortly before the outbreak of the typhus epidemic, the number of germs in the filtered water had increased considerably. . . .

After the attention had by the earlier typhus epidemics been drawn to the possibility of an insufficiency in the filtration during a cold winter, there was again suspicion attached to the water-works when in January and February, 1893, cholera cases occurred spread over the whole town, without connection with each other. As to these cases being brought from Hamburg, which in the summer had been a frequent means of infection, there was no suggestion, since in some of these cases the persons had not left their dwellings, and in the others no connection with Hamburg could be shown. More especially could this not be thought of as at that time the cholera in Hamburg had been quite extinguished. With regard to some of the last cases in Hamburg, it was supposed there that the infection came from Altona, or at least from the Hamburg suburb of St. Pauli, which had been supplied with Altona water for some months. This fear had, as a consequence, that the mains supplying the Altona water were cut off at St. Pauli.

The question was then raised whether the suspicion was a reasonable one, and for this purpose recourse was again had to bacteriological investigations. From October 1st, 1892, Weisser had nearly every day investigated samples taken from the pure water reservoir of the Altona water-works. From Weisser's figures it could at once be seen that already in the first week of December a quickly passing increase of bacteria had taken place in the filtered water. From December 30th, 1892, the number of germs again began to increase and reached on January 12th, 1893, the number of 1516. It then decreased again for a short time, but rose in the last week in January from 1200 to 1400. That some kind of disturbance must have occurred in the process of filtration was therefore beyond doubt. When such disturbances occur they naturally never affect all the filters at the same time, but always only some of them ; and in order to discover the defect one ought to have at once bacteriologically investigated each filter. Unfortunately, this could not be done straight off, as the filters were not supplied with means so as to enable the filtered

water to be taken separately from each of them. Only filter No. 8 could be investigated by itself, Nos. 1 to 4 flowed together in a common pipe into the pure water reservoir, so also Nos. 5 to 7, and Nos. 9 and 10, so that these filters could only be tested in groups. Already on January 31, according to the investigations of Weisser, the number of the germs had decreased to 354 (on the day before they were 1256*). From February 1st we have at our disposal the results of the investigations of a bacteriologist who was appointed at the Altona water-works in order to make daily investigations as to the results of the separate filters. From February 3d filters Nos. 9 and 10, and from February 8th all the filters could be separately investigated. The figures for the month of February are to be found in the following table.

The figures on this table are of the greatest interest. They show that on February 1st filter No. 8 did not exercise its function properly, as also [? on February 2d] group 9 and 10, in which, as resulted from the investigation on the following day, filter No. 10 was the one which filtered badly. Also group 5, 6, and 7 did not give a sufficiently purified water. In the pure water reservoir there were found at that time 154 germs in a cubic centimetre, a figure which would have hardly

NUMBER OF GERMS CONTAINED IN THE WATER OF THE ALTONA WATER-WORKS.

Feby.	Filter.										R. W.	E. W.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.		
1								832			154	28,520
2		88				212		550	908		142	35,340
3		106				374		R.	76	636	110	40,920
4		123				276		208	96	530	146	31,360
5		176				206		544	84	362	105	33,480
6		418				306		401	82	334	68	39,680
7		234				204		446	94	R.	94	41,660
8	50	22	40	24	28	136	146	368	84	152	130	25,560
9	48	28	R.	32	54	194	152	182	64	122	72	44,140
10	108	50	88	20	28	120	98	110	58	112	126	42,160
11	68	60	76	78	36	140	R.	126	76	204	152	34,100

* The last figures are not from samples from the pure water reservoir, but from a tap in the Garrison Hospital at Altona. The water of the pure water reservoir would, owing to its being nearer to the filters, probably have given somewhat lower figures.

February.	Filter.										R	E. W.
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.		
12	72	58	240	60	38	110	288	80	70	282	82	26,040
13	34	30	560	48	28	82	214	186	86	374	104	24,800
14	40	46	354	24	18	52	164	142	46	364	142	34,080
15	26	28	76	14	18	44	74	48	26	72	49	40,260
16	38	26	84	24	22	52	76	60	R.	120	78	25,420
17	20	36	156	R.	22	48	82	86	324	130	95	26,400
18	26	18	102	54	32	54	112	72	82	126	91	26,440
19	24	20	88	78	28	44	98	82	64	102	70	24,800
20	26	22	70	104	24	36	96	88	34	78	46	19,840
21	20	14	80	68	R.	34	96	44	30	152	50	34,720
22	34	R.	46	62	158	34	68	36	64	*	42	18,250
23	46	246	52	66	138	46	56	54	72	174	68	14,560
24	22	42	32	36	72	22	72	76	34	44	54	11,080
25	18	36	30	28	48	16	48	42	36	38	48	12,360
26	14	20	24	21	34	12	40	36	28	34	32	9,370

R. Cleansing of the filters. R. W. Pure water reservoir. E. W. Elbe water before filtration.
* Experiment failed.

given reason to suppose a disturbance on the process of filtration ; and yet two of the filters at least were filtering badly. But the resulting defects were so far concealed by the better performances of the other filters that the total water of the pure water reservoir could only give a very faint intimation, which might easily have been overlooked. On the previous days, when much greater numbers of germs were found in the mains, the disturbances in the process of filtration must have been much more considerable. It may be supposed, by the fact that the filters had in the process of filtration obtained an increased layer of mud, that these disturbances had diminished to the extent shown by the figures of February 1st.

Further attention should be also given to the bacteriological results of the filters immediately after they have been cleansed. The table shows us that a filter, after cleansing, exercises its functions insufficiently for some time. From the figures of the following month, which on the whole agree with those of February and therefore need not be given, it appeared that the renewal of the sand layer, which must be renewed in every filter from time to time, occasions an even greater disturbance than a simple cleansing. Filter No. 10, after it was filled with sand on March 13th, had on March 15th, 1880 germs ; on March 24th still 148. Filter No. 8 had, previous to the renewal of the sand, for many days 20 to 30 germs. Immediately after the renewal 1364 germs (on the two following days, 468 and 244).

In other respects the investigations which were daily carried out confirmed the previous experiences that a filter filtering properly should give water with less than 100 germs.

These results are of the greatest importance for forming a judgment as to the performances of a filter, and I shall have later on to go back to them.

The filter which was working worst was, according to the investigations of February 1st, filter No. 8. An attempt was therefore made to discover the defect which had caused the disturbances in filtrations ; fortunately the defect was discovered. On February 3d the water standing over the sand layer of the filter was let off and the mud layer was removed. As Director Kummel wrote to me on February 4th, it was found that the sand layer was frozen at the top. According to the communication of Mr. Kummel, the freezing of the sand layer took place in the following manner. When, after a longish period of frost, a milder weather had followed, it was thought well to make use of it in order to cleanse the filters. This was first done at a moderate cold temperature with filter No. 8, which was freed from ice, and the water allowed to run off. Now, however, unexpectedly the temperature changed to 14° Réamur of cold, and as a result the surface of the filter was frozen completely, so that the cleansing could only be finished with the greatest difficulty. The filter was then filled with water and allowed to stand the usual period of time, but the result was that it hardly filtered at all—that is, that hardly any water passed through it. It was only after several days that the filter worked at a pace of 40 mm. [per hour]. It then improved, and ultimately filtered at the pace of nearly 80 mm.

The defect in the process of filtration was therefore shown to be due to the freezing of the sand layer on the surface during the cleansing. The freezing of the sand made the filter quite impermeable for water, and the filter at first, therefore, could not work at all. Gradually, however, the ice under the water and in contact with it must have melted away in various places, whereby the filtration could again take place, first, with a pace of 40 mm., and ultimately of 80 mm., or nearly the usual pace. These figures must be taken as meaning that the filter gave as much water as it would have given if its

whole surface had been permeable and it had been filtering at the pace of 40 mm. or 80 mm. respectively. But in this case the whole surface was not permeable, but probably only a small part filtered at all, for on February 3d nearly the whole surface of the sand was found ice-bound. From this we can further conclude that the movement of the water through the unfrozen portion of the surface must have taken place at a rapidity in inverse proportion to the smallness of the permeable area. . . .

In order to be able in winter to cleanse open filters, the occasionally quite thick ice coverings which are sometimes formed by the water still unfiltered standing above the sand must be removed. This ice-covering is broken and the ice taken in pieces out of the water. . . . The greater the superficial area of a filter the more difficult it is to prevent the formation of ice on the filter. . . .

The winter with its periods of frost is not the only enemy of filtration. In summer there are also periods in which it is hardly possible to obtain a proper filtration. This is the case when the water becomes rich with microscopic plants (period of the so-called "water-bloom"), and at the same time the consumption of water is at its highest. These micro-organisms have mostly slimy integuments, which rapidly stop up the pores of the filters and make them already, after even a few days, incapable of filtering properly. The increased consumption of water in summer does not permit a sufficient time being given for the filters to rest after cleansing; they are worked too soon after cleansing and at too high a pace of filtration, and as a result give a filtered water which is insufficiently purified.

Fortunately such disturbances, which occur often enough in nearly all filters, do not always produce similarly dangerous epidemics. There must be in the natural water the infectious matter, as well as insufficiency of filtration, to enable such a misfortune to result. Then, also, there is not a defect in the whole filtering works, so that all the water goes unpurified through the filters; but as a rule this is only the case in one or a few filters which are temporarily filtering badly. The filter, also, even in the most unfavorable case, only permits a part of the infectious germs to pass. But that even this part

can have an epidemic as a result has been seen in the typhus epidemics in Altona, in the typhus epidemics in Berlin (1889), which had its origin in the Stralauer water-works, and also the cholera epidemic in Altona during the two first months of this year.

It has already been mentioned that, even in the first week of December, the filtration was for a time insufficient. At that time Hamburg had been for some weeks free from cholera, and it was just then that the first isolated cases of the after-epidemic occurred (from December 6th to 11th, three cases). There was, therefore, at that time, not yet any infectious matter in the Elbe water, and the defect in filtration was without bad results for Altona. In the mean while, the small after-epidemic in Hamburg (from December 20th to 27th, twenty-seven cases) was developed, with the result that infectious matter was communicated to the Elbe, and when toward the end of December the disturbance at the Altona filter which we have described at length occurred, the germs of infection were communicated throughout that town and caused the appearance of isolated cases which could not be explained as having been brought in from Hamburg. The infection of the Elbe water can, owing to the small number of cholera cases in Hamburg, only have been slight, and apparently only two filters were defective, and it must be ascribed to these circumstances that the outbreak of cholera in Altona was restricted to small dimensions, and that when the filters were put into proper order it soon ceased. Had Hamburg at that time produced more infectious matter, and had the disturbances in the process of filtration lasted for a longer time, there would have been more serious results from this small after-epidemic. There would then have been reason to fear that as the drains of Altona communicate with the Elbe, there would have resulted a "vicious circle," so that the cholera would have wintered in Altona, a result which one would have avoided at all costs.

When I just now talked of infectious matter which was communicated to the Elbe water from Hamburg, this was not in any way a hypothesis, but, as has already been mentioned in a previous paper, cholera bacteria had been as a fact found in the Elbe water. They were found in the Elbe water a

little below the place where the Hamburg main sewer flows into the Elbe. They were also found in one of the two basins into which the water flowed before filtration. In the filtered water they were, it is true, not found, but they would probably have been found if greater quantities of water had been examined than was the case.

These are the facts which I have to state as regards the relation between water filtration and cholera, with special reference to the epidemics in Altona and Nietleben. The question now arises, what are the lessons which we can draw from them as to the future.

(*To be continued.*)

STAMINA THE BEST PROPHYLACTIC.—In the Institute of Experimental Pathology in Vienna, Professors Hasterlik and Stockmayer, four students and others swallowed a quantity of comma bacilli. They suffered no bad effects beyond headache and nausea. Professor Stricker therefore draws the conclusion that the comma bacilli will not cause cholera in the case of strong, healthy subjects.

CHEAP TOOTH BRUSHES DANGEROUS.—An operation for appendicitis upon a patient living in this State revealed the fact that the disorder was due to the presence of tooth brush bristles. "Cheap tooth brushes," remarked the Albany surgeon who had charge of the case, "are responsible for many obscure throat, stomach, and intestinal ailments. The bristles are only glued on, and come off by the half dozen when wet and brought in contact with the teeth."

This is a good argument to use at the counter in discouraging the sale of the cheap and, as the above item shows, dangerous tooth brushes with which the fancy-goods trade is flooded. It were better for the user to pay fifteen or twenty cents more for a brush well made than to risk the dangers attending the use of the cheaper makeshift.—*American Druggist.*

ARTESIAN WELLS.*

By OSCAR C. S. CARTER, Professor of Geology and Mineralogy, Central High School, Philadelphia.

WITHIN the last few years a great many artesian wells have been drilled in Pennsylvania to obtain pure drinking water for towns, villages, and farms, and also for various manufacturing and industrial purposes, such as the manufacture of artificial ice, the brewing of beer, and for use in steam and locomotive boilers. The two principal questions to consider in artesian water are the quality and the quantity. First, as regards the quality, there can be no doubt that water which filters through from 200 to 500 feet of rocky strata is free from all deleterious organic matter. Disease germs, which sewage in river water renders so common, are unknown in artesian water, unless the well be drilled in a thickly populated district or be improperly cased. Artesian water comes to the surface clear and sparkling, and is never muddy from clayey matter or dirt held in suspension. The geological formations of Southeastern Pennsylvania contain prolific water-bearing strata. Wells drilled in the sandstones, clay slates, and shales of the trias, in the mica schists and gneisses of the Philadelphia group, in the Silurian limestone, and in the Potsdam sandstone, generally yield an abundance of water; occasionally, a barren locality is met with, but this is rarely the case. It would be impossible to lay down any hard-and-fast rule as to which formation furnishes the most abundant supply of water; an examination of the records of the accompanying wells will give some idea. The new red sandstone shales and slates and the mica schists of the Philadelphia group yield an abundant supply of water. The Silurian limestone in this vicinity often dips steeply, but gives a good supply. Thus far wells drilled in the Potsdam sandstone have not yielded as much water as the above formations, although a good sup-

* From the *Journal of the Franklin Institute*. Read at the stated meeting of the Chemical Section, March 21st, 1893.

ply is obtained. It may be stated, as a rule, that those stratified rocks which are highly jointed, fissured, and porous, furnish many easy channels for the passage of rain-water to strata situated at great depths, and that beds of clay, clay slates, fine-grained sandstones, quartzites, and compact mica schists make very good confining beds. The quantity of water furnished by deep wells near Philadelphia is enormous. The well at Lansdale, Montgomery County, can yield 288,000 gallons per day; the two wells at Jenkintown, 216,000 gallons each per day; the well of the Oriental Bath Company, 1104 Walnut Street, 144,000 gallons per day. One popular error seems to have gained a foothold, that a well is of little interest unless it be a deep one, and that the deepest ones furnish the most water. Many lose sight of the fact that the object of drilling a well is to obtain water, and when an abundant supply is reached at a moderate depth it is a useless expense to drill deeper. Shallow wells often yield enormous quantities of water. A drilled water well only 35 feet deep and 6 inches in diameter, at Washington Square, gives over 1500 gallons per hour, and does not lower no matter how much is pumped. (See *Proceedings American Philosophical Society*, May 1st, 1891.)

What kind of Rocks yield Hard Water and what kind Soft? —Whether a water be hard or soft depends mainly upon the composition of the soil and rocks through which it filters. Water that passes through calcareous or magnesium rocks of great thickness will probably be hard, while water that passes through rocks composed of silica, alumina, iron, potash, or soda will probably be soft. The great deposits of limestone, marble, gypsum and other calcareous rocks, as well as the magnesian rocks, such as dolomite, chlorite, and talcose schists would then yield hard water. The granites, gneisses, and many sandstones and slates would furnish soft water. This, in the main, is true, although there are some exceptions which local conditions modify. Some sandstones will yield soft water, while other sandstones furnish hard water; it depends mainly upon the cement which binds the grains together; if the cementing material be carbonate of lime or sulphate of lime, the water will probably be hard, especially if the well be of great depth and the water be long in contact with the

rocks. If, on the other hand, the cementing material be feldspar, such as orthoclase or albite (not labradorite), or even gelatinous silica, the water will probably be soft.

In England, many determinations of the hardness of spring and artesian water from different geological formations have been made, so that it can be safely predicted what kind of water an artesian well will yield when it is drilled in the Devonian, in the Silurian limestone, in the new red sandstone, or in the chalk.

DEEP ARTESIAN WELL WATER (*England*).

	Hardness.	
Water from Devonian sandstone	17°	Hard waters.
Water from magnesian limestone	43°	Hard waters.
Water from new red sandstone	17°	Hard waters.
Water from chalk	27°	Hard waters.
Water from granite and gneiss, soft.		
Water from Silurian sandstones, slate, and shales, soft.		
Water from millstone grit, soft.		

Water which flows through calcareous channels is hard, while that which flows through silicious rocks is soft. The same facts are noticed in the artesian wells of Pennsylvania. Artesian water from the new red sandstone is generally hard, though not so hard as the English new red water. An analysis of a new red water from a well 102 feet deep, at Norristown, gave me 11.8° of hardness; the hardness was mostly due to carbonate of lime, although some sulphate was present. The magnesian limestones of Pennsylvania furnish hard water; this is noticeable at Reading, Pa., where a limestone stream empties into the Schuylkill and neutralizes the water from the coal mines, which is charged with sulphate of iron and a little sulphuric acid. When the streams meet, sulphate of lime is precipitated, and also carbonate of iron, which decomposes to ferric hydrate, and can be seen as a brown stain on the dam near the city.

Many of our deep marble and limestone quarries of Montgomery County, Hitner's, Henderson's, Graver's, Rambo's, and others, are always partially filled with water; this is not rain-water, because at Graver's quarry the rotary force pumps

were running eight months of the year night and day, with an eight-inch and four-inch discharge pipe, and the quarry was not nearly pumped dry. This water filters through the limestone and is not always hard, because at Rambo's quarry the water was used in the boilers, and the engineer reported no scale or precipitate present. Deep artesian water from clay slates and shales of the trias is often a little hard. (See analysis of boiler scale from Lansdale artesian well water.) Deep artesian wells in the mica schist and gneiss of Philadelphia and vicinity furnish water of slight hardness; this hardness disappears when the well has been in use for several months, and is not sufficient to interfere with its use for industrial purposes. The purest and clearest water in this vicinity would be obtained by drilling in the syenite and granitic rocks. The water that issues from the granitic rocks and hills above Lafayette Station is of exceptional purity and is free from organic matter.

Rate of Drilling different Rocks.—The rate of drilling through the various rocks, such as granite, syenite, mica schist, hornblende schist, sandstone, limestone, clay slates and shales, is a very important and interesting feature, as a saving of time and expense depends on it. There are several factors that enter in the problem of rapid rock drilling; the most important perhaps are the hardness and compactness of the rock, and the weight, temper, and drop of the drill. The most difficult rocks to drill through are trap, quartzite, compact fine-grained sandstones, certain clay slates, granites, syenites, and compact hornblende schist, obsidian, etc.

The softer rocks, such as talcose and chlorite schists, serpentine and other magnesian rocks, limestone, dolomite, hydro mica schists, and many coarse-grained sandstones are readily drilled through. The following table will show the thickness of rock pierced by a chisel drill 20 feet long $5\frac{5}{8}$ inches in diameter, weighing 700 pounds, guided so as to make a round hole:

Locality.	*Rock.*	*Rate.*
Duffield's farm, on Stony Creek, near Belfry	Clay Slate (Trias),	4½ feet drilled in 10 hours.
Ice Company's well, Norristown	Sandstone (Trias),	5 " "
Kunkle's farm, Valley Green Road, near Flourtown	Limestone (Silurian),	5½ " "
Wheadley's farm, Chester County	Hydro Mica Schist,	7 " "
Wm. Janeas farm, near William Station	Sandstone (Potsdam),	10 " "
Roberts well, Spring Mill	Sandstone (Potsdam),	18½ " 7 hours.

The Potsdam sandstone at the above localities is not like the hard edge hill rock and conglomerate, but, on the contrary, is soft and micaceous, which accounts for the rapid progress. When the Schuylkill Valley Railroad was built the Pennsylvania engineers found the hardest rock they had to drill along the Schuylkill was the trap rock at Conshohocken ; the next hardest was the syenite, below Spring Mill. One contractor forfeited his contract on that account ; next came the mica schist, then the sandstone, and last the limestone. The minerals which compose a rock may be very hard, and yet the cementing material may hold the grains so loosely that the drill will make rapid progress through the rock. Sandstone, when composed entirely of silica, or when the cementing material is gelatinous, silica as in quartzite, is extremely hard to drill, but when the cement which binds the grains is feldspar, which decomposes readily, then the grains are loosely held, and the rock is readily drilled. The hardness of a steel drill is over 7, while the hardness of the minerals which go to make up the great mass of rocks is under 7. Feldspar, 6 ; hornblende, 5 to 6 ; augite, 5 to 6 ; mica, 3 ; limestone, 3 ; dolomite, 3½ ; talc, 1 ; quartz, which has a hardness of 7, is the most abundant mineral, and rapidly wears and destroys the temper of a drill. Coarse-grained rocks are more readily drilled than fine-grained. Steeply dipping strata are more difficult to drill on account of the trouble in keeping the drill vertical. Sayer's well, at Fox Chase, was drilled in the mica schist. There was one vein of rock in this well, probably quartz, only seven inches in thickness, that took eighteen hours to drill, and required twelve sharp drills in that time.

Cryolite in a Philadelphia Artesian Well.—William W. Matos, a student of the Central High School, presented me with two specimens of minerals, which he said came from an artesian well ; on examination, they proved to be cryolite. One specimen contained several rhombohedra of siderite, which frequently accompanies Greenland cryolite. The other specimen contained, besides cryolite, some siderite, galenite, quartz, and a little copper pyrites, all of which are found in the cryolite of Ivigtuk, Greenland. The specimens were about the size of common marbles. On telling him that it

was unusual to find cryolite except in Greenland and a few other localities, and that there must be some error, he volunteered to see the driller again and question him closely. The specimens are without doubt cryolite. The exact locality of the well is about Fiftieth Street and Columbia Avenue, on land belonging to Pennsylvania Railroad. The well was drilled by Brush & Co., a New York firm. On asking why the specimens were not ground to powder by the drill, he said that when drilling at a depth of 280 feet they struck a water crevice, and the drill fell a short distance and broke off some fragments of the surrounding rock ; these were drawn up by the sand pump, and the specimens of cryolite were among them. The driller says the cryolite was broken into several small pieces, and estimates the depth at which it was broken off to be about 280 feet. He thinks the vein is only a few inches in thickness. The well was drilled to obtain water for the locomotive engines of the Pennsylvania Railroad Company. The rock passed through was mica schist and gneiss, and at and around 280 feet the driller pronounced the rock very hard. The diameter of the well is six inches, and they quit drilling at a depth of 350 feet. The water rises in the well to within 25 feet of the surface of the ground, and on pumping without a force pump, and using only a small engine pump, the well yields 2400 to 3000 gallons per hour ; it would give much more with an improved pump. No specimens were found below 280 feet. The finder was Mr. Richard Wickward.

Cost of Artesian Wells.—The price of drilling is about $2 per foot in Montgomery County for wells 6 inches in diameter and from 100 to 200 feet deep ; this is independent of the character and hardness of the rock. A hard clay slate requires twice as long a time to drill as a loose mica schist or a decomposed sandstone, and yet it would be a difficult matter to regulate the price according to the hardness of the rock and the difficulty of drilling, because in many wells alternate beds of sandstone, red shale, and sometimes clay are met with. An examination of the table on the rate of drilling will show that the rate with which different rocks are drilled varies greatly, yet the same rate per foot is charged for granites, syenites, mica schists, sandstones, and limestones. I have known the drillers to make the unusually slow progress of six

inches in ten hours when a very hard quartzite was being drilled. Sometimes they are delayed more than a month over the usual time required to drill a well by some unusual obstruction, such as a hard, steeply dipping stratum, when it is almost impossible to keep the drill vertical and the well straight; occasionally, the tools become loosened and drop down the well, and a week or more is wasted in grappling for them. The six-inch iron pipe (internal diameter five and five-eighths inches), which is used to line the well, varies in price from forty to fifty-five cents per foot. Most of the wells in Montgomery County, which will be referred to later, and whose depth varies from 50 to 200 feet, were drilled at the rate of about $2 per foot. The driller of these wells guarantees water, and promises to finish the well and test it or no pay. If the water should be chalbyeate or colored, which is rarely the case, he agrees to pump it until it becomes clear.

In Philadelphia, the charges vary and contracts differ in terms. Some drillers contract, for a certain specified sum, to drill a well that will furnish a certain amount of good water per minute, generally fifty or seventy-five gallons. The contract price includes everything, casing, coal, and testing.

Many of the Philadelphia wells are double-cased; the first pipe put down is an eight-inch pipe; then a six-inch pipe is put down inside of this, and the space between the two is filled with hydraulic cement.

Some contracts have been made at the rate of $4 per foot; this includes the drilling, casing, testing, and everything connected with the well.

Other contracts have been made at the rate of $2.75 per foot for drilling down to 500 feet, and $3 per foot for drilling below a depth of 500 feet; this does not include the iron pipe for casing, but only the drilling.

Deep Artesian Wells in the Red Shales and Clay Slates of the Triassic.—At Lansdale, Montgomery County, Pa., on the line of the North Pennsylvania Railroad, three artesian wells were drilled for Effrig & Son, pork-packers.

The first well is 159 feet deep, the second one 376 feet, and the third and latest one is 611 feet deep. These wells are within 50 feet of one another. The last well has 259 feet of iron pipe as casing, and, on pumping with a small pump, gives

70 gallons per minute ; with a larger and improved pump, it will give 200 gallons per minute, or 288,000 gallons per day. The supply seems to be practically inexhaustible. The water rises to within 140 feet of the top of the well.

No systematic record of the borings was kept. Rock was first struck at a depth of 12 feet.

The drill passed through alternate layers of red shale, red sandstone, blue clay slates, and black carbonaceous slates. A small bed of carbonaceous slate, six or eight inches thick, was struck, and also a bed of the same character 20 feet thick. This last bed was found at a depth of 40 feet from the surface. Under this bed of black clay slate was a deposit of what they supposed to be cannel coal, but it was evidently a shale or slate, very rich in carbon.

The water from these wells when used in boilers deposits a scale, which I analyzed and found to consist of $CaCO_3$, $MgCO_3$, $CaSO_4$, $MgSO_4$, NaCl, and a trace of iron, sufficient to color slightly the scale. The water is not very hard, the hardness being mainly due to $CaCO_3$, which makes up the bulk of the scale. This hardness of the water is only temporary and will disappear when the well has been in use for several months and continually pumped, as fresh water takes the place of that which has long been in contact with rocks, and which has dissolved out the salts of lime and magnesia. This I have noticed to be the case in several wells ; when the well is first drilled, the water is hard enough to require a small amount of soda in the boiler as an anti-incrustator. It acts by precipitating the lime and softening the water. After the well has been pumped for several months the hardness disappears and the anti-incrustator is dispensed with.

The 611-foot well was six months in drilling. The drillers complained that the clay slate was very hard and contained much quartz, which kept them drilling much longer than usual.

The above facts correspond well with those obtained from another well drilled a few miles from Lansdale, on the Duffield farm, between Custer and Belfry, on the Stony Creek Railroad. (See *Proceedings American Philosophical Society*, vol. xxix., May 25th, 1891.) In this last well, the bed of very black rock, supposed to be coal, was found at a depth of about 40 feet from the surface ; this is the same depth as the Lans-

dale bed. I understand the same bed of coally rock was found when Mr. Rozenzi drilled the very deep well in Bucks County for gas. Another firm drilled the Duffield well, and they made the same complaint about the hardness of the rock. One bed in particular, that was supposed to be quartzite, was so hard that only six inches of it could be drilled in ten hours. The Duffield well is only 65 feet deep and yields but 60 gallons per hour, while the Lansdale well yields 200 gallons per minute. In these tightly packed clay slates an abundance of water is found only at great depths.

He Got a Receipt.—"Some time ago I was trading in a village store," says a correspondent, "when one of the clerks came to the junior partner, who chanced to be waiting on me, and said, 'Won't you please step to the desk a moment. Pat Flynn wants to settle his bill, and insists on having a receipt.'

"The merchant was evidently annoyed. 'Why, what does he want of a receipt?' he said, 'we never give one. Simply cross the account off the book; that is receipt enough.'

"'So I told him,' answered the clerk, 'but he is not satisfied. You had better see him.'

"So the proprietor stepped to the desk, and greeting Pat with a 'good-morning,' said, 'You wished to settle your bill, did you?' to which Pat replied in the affirmative.

"'Well,' said the merchant, 'there is no need of my giving you a receipt. See, I will cross your account off the book;' and suiting the action to the word, he drew his pencil diagonally across the account. 'That is as good as a receipt.'

"'And do you mane that that settles it?' said Pat.

"'That settles it,' said the merchant.

"'And ye're sure ye'll never be afther askin' me fur it again?'

"'We'll never ask you for it again,' said the merchant, decidedly.

"'Faith, thin,' said Pat, 'and I'll be afther kapin' me money in me pocket, for I haven't paid yet.'

"The merchant's face flushed angrily, so he retorted, 'Oh, well, I can rub that out.'

"'Faith, now, and I thought that same,' said Pat.

"It is needless to add that Pat obtained his receipt."

THE CLIMATE OF JAMAICA.*

By James Cecil Phillippo, M.D., Edinburgh, President of the Medical Council, Jamaica.

Jamaica is an island in the Caribbean Sea, situated south of the islands of Cuba and Hayti, between which vessels from the Northern United States and Canada must pass in order to reach it. It is about 140 miles long, and its greatest breadth is 49 miles, with safe and convenient harbors all round it, to which two or three coasting steamers make weekly visits; about six days' voyage from New York and three and a half from Tampa Bay in Florida.

A strip of nearly level land, in some parts a few miles in breadth, lies along the coast, partially cultivated as sugar estates, banana and grazing properties, and abounding in dyewoods; but the interior is exceedingly mountainous, with deep gorges, fertile valleys, numerous springs and rivers, and dense forests, which reach to the height of 7380 feet.

There are about 2000 square miles of land along the coast, rising to 1000 feet of altitude, 1452 square miles between 1000 and 2000 feet, 400 between 2000 and 3000, and 127 from that height to 7380 feet, thus affording great varieties of temperature.

The temperature varies but little during the year in the lowlands, though the winter months from November to April are cooler, drier, and healthier than the others. Thus the weather reports for Kingston, the chief city and port in the island, gives a mean average daily temperature from 1880 to 1890, taken at 9 A.M. and 3 P.M., as 78°, the highest mean maximum during those years being 86°, and the mean lowest, 68°. At the Cinchona plantation, on the other hand, which is about 5000 feet altitude, the mean maximum during the day was 64° to 68°, and during the night from 53° to 57°. The temperature also diminishes during the winter months, when the

* Read in the Section on Hygiene, Climatology, and Demography, Pan-American Medical Congress, Washington, D. C., September 6th, 1893.

north winds prevail, and the English troops at Newcastle, the military camp, at 3800 feet altitude, are glad to make use of two or three blankets at night; and American tourists at Castleton, at 600 feet altitude, have found their ulsters not uncomfortable.

The temperature of the lowlands is tempered by the small amount of humidity during the dry winter months, when it averages about 70°, the maximum being 80° at 7 A.M., and the minimum in the afternoon, and also by the sea and land breezes which blow almost invariably, there being only about fifteen calm days per annum on an average of several years. The sea breeze rises at about 10 or 11 A.M., and keeps on at a velocity of from 2.6 to 8.4 miles per hour until 5 or 6 P.M., when it ceases, to be replaced by the land breezes, with somewhat less velocity, at 8 P.M. to 6 or 7 A.M., about 3 A.M. being the coolest part of the night.

The rainfall varies considerably in different years and in different months of the year, and in the various districts of the island.

The observations made by Sir Hans Sloane two hundred years ago, and confirmed by our island meteorologist, Mr. Maxwell Hall, show that it is greatest in the months of May and October, and that in the winter months it averages two inches per month in the southern and five inches in the northern districts; and while the average total rainfall for the island for the last twenty years has been about sixty-six inches, it has varied in seven years from fifty-nine inches to one hundred and twenty-six inches.

These variations in our rainfall, of course, affect the general humidity and also our rivers and springs, of which we have a great many, giving, in fact, its Indian name—Xaymaca—to the island. Among these are to be found several mineral springs of great therapeutic value, especially to sufferers from gout, rheumatism, and various skin diseases, more strongly medicinal during the winter months, being less diluted by the rainfall. Of these the most esteemed are a sulphurated sodic calcic thermal, with a temperature of 132°, a saline calcic thermal at 92°, various cold saline calcic, and an acidulo ferro aluminous spring similar to those in Virginia.

Condensed as this paper is, I cannot conclude it without

remarking that, with a climate very similar to Algiers, now a great winter health resort for the Europeans, Jamaica presents to the America invalid many advantages which Algiers does not possess, for not only is the voyage shorter, but they can here obtain, within a radius of a few miles and of a few hours' journey, dry mountain situations with cheerful aspects, extensive views of tropical scenery, an invigorating, stimulating atmosphere suitable to the hypochondriac and the dyspeptic, and moist mountain situations for the nervous and those who suffer from a dry and irritable condition of the air passages; dry inland and sea-side situations for the leucophlegmatic and those who suffer from copious bronchial discharges, saline and sulphurous baths in the lowlands for the rheumatic and gouty, and chalybeate waters in the mountains for the anæmic.

MEDICAL EXCERPT.

By T. P. Corbally, A.M., M.D.

Cancer Treated with Chlorate of Soda.—The specific action of the solution of the chlorate of potash on epithelioma of the mucous surface of the digestive tube has been long recognized. It is also known that this agent acts favorably on cutaneous cancroids, as on epithelioma of the angle of the eye.

Influenced by these cases, M. Brissaud (*La France Médicale*, September 22d) has recently made some experiments with chlorate of soda, preferring it to the chlorate of potash, because of its greater solubility, and has obtained very remarkable results in epithelial cancers of the stomach, in cases in which the presence of tumors left no doubt as to the true nature of the disease.

He administered the chlorate of soda in doses of 12, 14, and 16 grammes daily; found the mœlena and the hematomesis cease entirely, the cachexia to disappear, and even the tumor to vanish in about six weeks.

The cures are found principally in the epitheliomas, and are not propagated to the liver nor to any of the other organs, and there is no complication, such as thrombosis, nor phlebetis.

The doctor gives at first from 8 to 10 grammes of chlorate of soda, in 100 grammes of water, by teaspoonful doses in twenty-four hours. He increases the dose gradually, until the hematomesis and the vomiting cease. It is important not to exceed 16 grammes a day, lest injury to the bulb might follow.

The chlorate of soda is a good substitute for chlorate of potash, for besides its greater solubility, it is less likely to produce injurious results.

Of *epithelial cancers* and the specific nature of the cells. M. Maurice Cazin states that he has had occasion to make a histological examination of a number of colloid cancers, and feels convinced that if in certain cases there may be a real degeneration of the cellular element and of the structual portion of the conjunctiva, there are other cases in which there is no degeneration—that is, no colloid transformation of the cells coinciding with the death of these cells, but rather a transformation of their functional activity in relation to their origin. It is thus that, in colloid cancer of the rectum, he has been able to satisfy himself of the perfect vitality of the cells contained in the mucous, or the colloid which constitutes almost exclusively the epithelial element throughout the whole extent of the primitive neoplasm and of the secondary ganglions attacked, each of these cells reproducing exactly the structure of the caliciform cells of the rectal mucous. In another case of colloid cancer involving the peritoneum, having its origin in the intestine, the same conditions were found in a distribution of the same mucous cells, with the different aspects which the caliciform cells normally present.

In cases of this kind we are fully authorized to consider the colloid state, not as the result of degenerative mortification of the neoplastic tissue, but as the result of the evolution, in some way physiological, of the elements arising from a surface which normally contains mucous cells and conveying with them the original power of producing mucous, just as in epitheliomas of cutaneous origin the cells convey with them the property of producing the matter of the cornea which are found in the epidermic globules.

In such cases it is evidently a question of facts, known to all pathological anatomists who have followed the evolution

of cancerous neoplasms ; but it is useful to insist on this specific character of the cell, which is very often neglected completely in the study of the pathogenic nature of epithelial cancers.

TREATMENT OF PNEUMONIA.—In view of the recent statements to the effect that early in the summer of this year pneumonia was much more prevalent than during the corresponding season in many preceding years, the following excerpt from the *College and Clinical Record* of June is of interest :

" Practitioners who are the most conservative in their views concerning the medication to be employed in acute inflammatory fevers, and who especially unite in deprecating the use of heart depressants, show a preference for phenacetine as an antipyretic. At the meeting of the American Medical Association in June last, Dr. Bailey said that phenacetine ' could be safely used as an antipyretic in pneumonia,' and pronounced it to be ' as efficient as the external application of cold water, and no more depressing to the heart.' In the same discussion Dr. Beatty said : ' Phenacetine is not objectionable as an antipyretic, because it does not affect the heart unfavorably.' Dr. Beatty, by the way, believes that in pneumonia venesection is never indicated. He says that sedatives are only exceptionally required in pneumonia, and gives the preference to phenacetine when such medication is indicated. He employs the same remedy in the treatment of the pneumonias of the aged, advising its use, in moderate doses, when the temperature rises above 102°. As cardiac tonics he entertains a preference for quinine, strychnine, or sparteine, to be administered as required. Other writers cite the excellent effects of phenacetine in quieting the pain and restlessness of pneumonia, and inducing that condition of gentle diaphoresis which promotes refrigeration, and is thought by some observers to hasten resolution. Cases of pneumonia are reported in which, when gastric or rheumatic symptoms were present, the remedy was advantageously united with salophen, the new anti-rheumatic."

THE PANCREAS—ITS INFLUENCE ON GLYCOSURIA—has been studied with much enthusiasm by M. Hédon, who has the direction of the course of physiology in the faculty of Mont-

pellier. M. Chauveau read for him, at the Académie des Sciences (*Gazette Hebdomedaire*, August 6th), a very interesting note, which gave a summary of a new series of experiments on the slow destruction of the pancreas.

"It follows from our experiments," said M. Hédon, "that rabbits in which the pancreas had been destroyed by the injection of a foreign substance into the duct of Wirsung become diabetic.

"The following are the successive results in rabbits which have been deprived of the pancreas: The diabetes is transitory. The glycosuria ceases after a certain time and does not reappear. The time varies according to the greater or less susceptibility of the animal. The polyuria disappears with the glycosuria. The animals having passed this stage, manifest no peculiarity; they increase in flesh and gain notably in weight, and behave in every way as animals in perfect health. At the autopsy, however, the pancreas are found to have been completely destroyed. My experience in this subject proves:

"1. That survival is possible, notwithstanding the complete destruction of the pancreas.

"2. That the glycosuria is transitory, and that when it ceases it does not reappear; that, in a word, they recover from the diabetes.

"3. That in the rabbit deprived of the pancreas and restored to health a puncture of the bulb causes the glycosuria to reappear.

"Other facts have been developed in the course of my experiments which show the little gravity attending glycosuria induced by the destruction of the pancreas. If, when the glycosuria had reached its full intensity, amylaceous substances are withheld from the food, the glycosuria disappears; but if immediately afterward oats be given to the animal, the glycosuria does not usually reappear. In regard to other animals the presence of glycosuria was very irregular, and its spontaneous appearance or disappearance very uncertain, and found only by analyzing the urine voided during the twenty-four hours."

From these experiments it would seem that the pancreas in the rabbit has not the functional importance that it has in other animals, as, for instance, the dog. But this proposition

being based on the comparison of the effects produced by the slow destruction of the pancreas in one case and the surgical removal of the gland in the other—that is, on the results of two methods entirely different—there remains some doubt as to its entire exactness.

Schiff, in his experiments, was able to destroy completely the pancreas of a dog by injecting melted paraffine into Wirsung's duct without causing the appearance of any morbid phenomenon.

The logical deduction to be drawn from this fact would be that the slow destruction of the pancreas has not the same effect as if it were rapidly suppressed as when removed by a surgical operation. But we are not able yet to decide with absolute certainty.

The Action of Bicarbonate of Soda on the Formation of Chyme in the Stomach was the subject of a report to the Société de Biologie, at its session July 22d ult., by M. Gilbert. The report (*Le Progrès Médicale*) gave the results of experiments which he had pursued for more than a year on the same animal. The dog had a gastric fistula, and the soda, mingled with any kind of food desired, could be introduced and its action studied with such dose as desired and at a time convenient for its administration. In large doses it retarded gastric action; in small doses it excited action if given half an hour before meals.

The Mechanism of Syncope from Chloroform, M. Laborde thinks (*Le Progrès Médicale*), besides the reflex irritation of the pituitary and the irritation of the superior laryngeal nerve, might, in some cases, have other very important influence.

M. A. Guérin, however, felt obliged to consider that, practically, it is the irritation of the pituitary which acts the most important part in causing syncope. For this reason chloroform should not be inhaled except through the mouth.

Iodine—its Action on the Staphylococus of the Blood.—M. E. Maurel reported to the Académie de Médecine at its session of August 8th last (*La France Médicale*),

that, according to researches he had made on leucocites, the experiments, which were successful, show the action of the staphylococus when used in cultures with glucose on the condition of the blood ; on the action of iodoform on the same elements, of the influence of the agent on the staphylococus applied by means of cultures, and, finally, the simultaneous action of iodoform on the elements of the blood and on the staphylococus. The result has been that :

1. It is impossible to base, on the reproductivity of the microbe, an estimate of its virulence ; it is necessary to recognize, in pathogenic microbes in general, and in the staphylococus in particular, at least three properties—its virulence, which in itself is multiple ; its reproductivity ; and its power of surviving.

2. The effectiveness of iodoform as a remedy against the staphylococus, so well established by clinical experience, is explained by the twofold action which unite to produce the effect ; an increase in the energy of the leucocites, and a diminution of the virulence of the staphylococus.

The Pliny Cure for Inebriety.—Dr. Robertson says, in the *Pacific Medical Journal*, " I will match Keeley's secret, as regards remedial value and scientific acumen, with one I recently found in the 1601 edition of Philemon Holland's translation of Pliny : ' For to avoid drunkenness, take the lungs of an hog, be it bore or sow, it matters not, in like manner of a kid, and rost it ; whosoever eateth thereof fasting shall not be drunk that day how liberally soever he take his drinke.' "

The Latest Animal Extract.—Alligatorine is the latest ! The homœopathists have beaten us. They have made the toad and the fox yield " most valuable therapeutic products," and now the prepared fat of the alligator, " saponified by alcoholic potash, the soap decomposed by hydrochloric acid, and the fatty acid mixed with cotton-seed oil," is highly recommended. Has any daring investigator prepared any extracts from the brain of our long-eared, four-foot d friend, the ass? The balloonist and thos afflicted with mountain sickness should get some extract of eagle's-wings, and surely mole's blood or flounder serum would at once cure caisson disease.—*Medical News.*

INTERNATIONAL CONGRESS OF PUBLIC HEALTH.

TWENTY-FIRST ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.

UNITED STATES, CANADA, AND MEXICO.

Chicago, Ill., October 9th–14th, 1893.

THE conditions under which the American Public Health Association held this, its twenty-first annual meeting, have been extraordinary. The meeting was one of numerous congresses which have been held successively at the Art Institute, in Chicago, for several months under the auspices of the World's Fair.

The entire series of congresses, of which this is one, were held under the patronage of the World's Congress Auxiliary, of which Charles C. Bonney is President, and, as usual in all cases, he opened the proceedings, on Tuesday, October 9th, by an address of welcome on behalf of that Auxiliary. He was followed by Mrs. Charles Henrotin, Vice-President of the Woman's Branch of the World's Congress Auxiliary, who made a brief address in the name of that branch.

Dr. Sarah Hackett Stevenson presented the greetings of the Woman's Club.

The programme called for an address from the Mayor of Chicago, but in his absence, Dr. Arthur R. Reynolds, Commissioner of Health of Chicago, presented the welcome of the municipality.

Dr. Edouardo Liceaga read in Spanish a greeting from the Mexican delegation to the assembled hygienists of America, of which the following is an abstract :

" *Mr. President, Ladies and Gentlemen :*

" In the name of the delegates of the Republic of Mexico to the American Public Health Association, I have the honor to extend a friendly greeting to those hygienists of America who, after meeting in general Congress in Canada and Mexico, have now met in the city of the World's Fair, in this grand and beautiful Chicago, Queen of the Lakes, to work

together in a great humanitarian cause, and render, at the same time, due homage to the illustrious man who has enriched mankind by the discovery of this immense continent.

"As representatives of our country, we have come to return the visit you have paid us in Mexico, and to tell our friends that they have left grateful remembrances among Mexicans. . . . We are now ready to follow our associates in the work of ameliorating the physical conditions of men, of improving public health, prolonging life, and contributing, by increased bodily health, to the improvement of the mind and to moral perfection. Moved by a common ambition, animated by the same love of truth, and by common aspirations, we have come to offer our co-operation, our contingent, which, however humble it may be in itself, will acquire strength and influence when added to the valuable concourse of the United States, of Canada, and of those from the Old World who, on this occasion, have taken part in the scientific work of the American Public Health Association."

Dr. S. H. Durgin responded to these several greetings. Some announcements were then made, and Mr. Bonney surrendered the chair to Dr. SAMUEL H. DURGIN, President of the Congress, who delivered his inaugural address, at the conclusion of which the Congress adjourned to Wednesday morning.*

Wednesday, October 11th.—The proceedings of the morning session opened the discussion of typhoid-fever, the subject being introduced by Professor W. T. Sedgwick, of the Massachusetts Institute of Technology at Boston, with reference to a published paper of his on "The Origin and Dissemination of Typhoid-fever." Professor Sedgwick went into considerable detail as to the manner in which typhoid-fever had been introduced into various cities of the commonwealth at different times, and the means employed by the Massachusetts State Board of Health to eradicate the disease and to ascertain its origin.

Sir Joseph Fayrer, Surgeon of the British Army in India, contributed a paper on "Tropical Diarrhœa," which was read by Dr. Gihon, U. S. Navy. Dr. Manuel Septien, of Mexico, read a paper in Spanish on "Cholera Infantum and its Treatment." Drs. R. Icaza and Luiz described typhus and typhoid-

* Dr. Durgin's address will be published entire in our next number.—EDITOR.

fever in the City of Mexico. Dr. A. C. Abbott, of Johns Hopkins University, read a paper concerning the "Causation, Spread, and Prevention of Typhoid-fever."

Dr. U. O. B. Wingate, of Milwaukee, described the system of the collection and disposition of animal and vegetable waste in that city, and W. S. McHarg, Water Engineer at the World's Fair, told how the World's Fair sewage was disposed of.

Colonel W. F. Morse described the improvements in crematory furnaces, and the Engle furnace in particular, in use for the disposal of the garbage and waste of the World's Columbian Exposition.

Lady Priestly, President of the Public Health Association of London, described at length the progress of sanitarian knowledge among the women of England.

The evening was occupied with an address by Surgeon-General George M. Sternberg, U. S. Army, on "Disease Germs," in which he said that recent experiments prove that exposure to a heat of 140.2° F. kill all that are not spore producing.

Thursday, October 12th.—At the morning session tuberculosis was the principal topic of discussion. D. E. Salmon, D.V.M., Chief of the Bureau of Animal Industry, read a paper in which he said :

"Tuberculosis, which is agreed to be a parasitic disease, generally gains entrance to the bodies of its victims either by being inhaled with the air in which it is floating or by being ingested with infected food or drink. Hereditary transmission of this disease has been greatly exaggerated as a factor in its production, and may from a practical point of view be left out of consideration. Infection by food is through the milk supply or the meat supply. Tuberculosis is one of the most common diseases of cows. In Europe from 50 to 80 per cent of cows have been found to be infected. Milk from cows so affected must be considered an extremely dangerous article of food."

Dr. Salmon further said that tuberculous meat was also a prominent vehicle for transmission of the disease. If meat was thoroughly cooked the bacilli were killed, but too commonly meat was eaten without being subjected to sufficient heat to destroy the disease germs. He declared that a much

more rigid inspection of meat by municipalities was of vital importance.

Manuel Guiterrez, of Mexico, next read a paper on the "Influence of Habitations in the Propagation of Tuberculosis." He attributed the frequency of the disease in the United States in large measure to the exclusion of pure air and light from many of the chambers in buildings, public and private. He thought those who were assiduously endeavoring to cure or prevent the disease by critical investigation of the food and water supply would accomplish much by giving attention to the conditions existing in modern dwellings, where thousands daily are deprived of that great natural antiseptic agent, the pure air of heaven.

The death-rate from consumption in Mexico is only 60 in 1000 against 118 to 120 in the United States.

Dr. Carmona y Valle read a paper on "Syphilitic Infection as a Vehicle of the Communication of Tuberculosis," in which he described a case of that kind.

Discussion followed these three papers. Dr. Oldright attributed the tendency of high-bred cattle to in-and-in breeding. Dr. Liceaga said that altitude is the principal factor in controlling tuberculosis. Dr. Quimby said that bacilli do not attack a healthy body. Dr. Smith advocated dryness of residence, and attributed many cases of tuberculosis to dampness induced by shade trees. Dr. Salmon doubted whether ingested food could affect the lungs, and thought the question could be settled by ascertaining whether initial lesions are in the abdomen or in the lungs. He has found them in the mesenteric gland. Dr. Salmon said that the tubercle bacillus probably does not form spores. As the expense of stamping out tuberculosis is considerable, it is not necessary to kill the cows, but only to prohibit the sale of milk.

Mrs. Ellen M. Richards read a paper on "The Prophylactic and Therapeutic Value of Food," in which she set forth the necessity of proper nutrition, and spoke of the difficulty of getting sufficient nutrition from food all fluid, and recommended more general use of a disinfecting stove in contagious diseases.

Dr. Angel Contraros, of Pueblo, read a paper on "Hygiene of Hair-Dressing and Barber Shops," and recommended care in cleansing tools.

"Objects of the National Health Society of London," by Dr. Ernest Hart, was read by title.

At the afternoon session a paper read by Health Commissioner A. R. Reynolds, on the "Water Supply of Chicago," on Wednesday, was discussed. The discussion brought out some facts at once interesting and gratifying to Chicagoans, and called attention to means for still further improving the water supply. In substance Dr. Reynolds said :

"The extensions of the various tunnels within the last two years have undoubtedly secured for the city a water less liable to sewage pollution than was formerly obtained. The available analyses of the water are perhaps inadequate to measure accurately the improvement, but fortunately we can apply that most satisfactory of all water tests, the typhoid-fever death-rate. The improvements in the water intakes have not all been made at a single date, but if we compare the two years ending September 30th, 1892, and September 30th, 1893, we find that during the earlier years the shore intakes at Lake View and Chicago Avenue were in common use, while the four-mile tunnel was not yet opened, while for the greater part of the latter year the shore inlets were entirely closed and the four-mile tunnel and the one-mile tunnel at Lake View were in use. For the year ending September 30th, 1892, the number of deaths from typhoid-fever in Chicago was 1790, in total of 26,646, or a percentage of 6.72. For the year ending September 30th, 1893, deaths from typhoid-fever were 712 in a total of 26,977, or a percentage of 2.64. It is most unfortunate for this comparison that the old supplies were partly in use during the first few months of the latter year, before the four-mile tunnel was opened. We may believe that if this had not been the case the comparison would have been still more favorable to the improved supply. It is a well known fact that people using a water supply to which they are not accustomed are often more susceptible to any infection which it may contain than are those using such water regularly. A striking illustration was furnished by Philadelphia in the centennial year, when the typhoid death-rate was nearly doubled, while in Chicago the present year for the first five months of the Fair period the rate has been less than half as high as for the corresponding month of the preceding year,

and for the entire year under consideration, in spite of the vast number of visitors continually present, there has been a reduction of over 60 per cent in the typhoid-fever death-rate. This reduction is most striking, and it can hardly be doubted that the improvements in the water supply have been the chief if not the only cause. As there is no marked local distribution of the typhoid-fever, so there were no exceptions to the general improvement with better water supply. Not a single ward but showed a substantial reduction. Stronger evidence could hardly be produced to show the casual relation between the contamination of the water supply and typhoid-fever. The mortality percentages from typhoid-fever in a number of cities may be compared as follows: Chicago, 1892, 6.72; in 1893, 2.64; Philadelphia, 1892, 2.22; Boston, 1.22; Paris, 1.01; New York, .90; Brooklyn, .80; London, .49; Berlin, .42. The cities having the lowest typhoid-fever death-rate, London and Berlin, use only filtered water. London draws nearly all of its water from the two grossly polluted rivers, the Thames and the Lee, and, after filtering it, supplies it to a population that is almost free from typhoid-fever. It may be a question worth considering by the engineers whether filtration would not be as cheap and effective a means of improving the water supply as the farther extension of the tunnels."

Bacteria in Water.—Following in the same line were three other papers, the first by George W. Fuller, biologist of the Lawrence Experiment Station of Massachusetts, on "Removal of Pathogenic Bacteria from Drinking Water by Sand Filtration," the second by Dr. Thomas Noriega, Adjunct Professor of Pathology in the School of Medicine of Mexico, on "The Necessity for the Filtration of the Potable Waters of the United States," and the third by Dr. Angel Gavino, of Mexico, on "The Potable Waters of the Country Presenting Many Dangers."

In discussing the papers on water supply, Dr. Lee thought the difference in death-rate between Philadelphia and Chicago during the Fair was due to the special water supply for the Fair ground in Philadelphia, where the water was drawn from a stagnant place in the river.

Dr. Sedgwick reported that at Lawrence the first sand filter

in America, covering two and one half acres, has just been put in operation with great success. The typhoid death-rate in the United States was highest in Massachusetts, if not in America. It requires about three weeks to get the filter in good working order. It has reduced the death-rate in two weeks 80 per cent, and in a week more it will no doubt reduce it 98 per cent, as London now does.

A paper by Dr. Hewitt on "Sanitary Organizations, National, State, and Municipal, in the United States from the Standpoint of an Executive Officer," was read by title.

Dr. Liceaga read "Statement of Scientific and Experimental Data for the Establishment of an International Maritime Police."

Dr. Orvañanos read a paper on "Difficulties in the Practice of Quarantine in Some of the Mexican Ports."

"The Canadian Quarantine System" was presented by Dr. Montizambert. He showed the thoroughness of measures now in vogue. All immigrant baggage that has been landed in Canada this year has been landed through disinfecting chambers. There is only one avenue out from the dock, and that is through the chamber where more than one hundred thousand pieces of luggage from healthy vessels have been sterilized.

Dr. Swearingen, Health Officer of Texas, read a paper on "Quarantine System of Texas." He said that they had to guard against small-pox from Mexico, where it is always present. The system was established in 1879, but local officers could put State officers in quarantine and keep them there until 1883. In 1891 the present law was passed, vesting control in one officer. An army of men could not guard against small-pox from Mexico, because the Rio Grande is fordable in so many places. The co-operation of Mexico is desired in stamping out the disease.

A paper on "Quarantine," by Dr. Olliphant, of New Orleans, was read by Dr. Salomon, in which Dr. Olliphant deprecates over-severity in deterrent measures till better information of facts is secured. Many quarantine measures have been very severe where they were really not needed.

The discus ion on quarantine was the most animated and protracted of the meeting. Dr. Orvañanos promised co-opera-

tion of Mexico in regard to small-pox, as requested by Dr. Swearingen in his paper. Dr. Holton spoke in commendation of Montizambert's thorough system, and Dr. Hewitt to the same effect stating that only two cases of sickness had occurred this year in some seven hundred immigrants from Canada to Minnesota. Small-pox, scarlatina, and diphtheria are more feared than cholera, and he inquired whether Canadian quarantine covered these. Dr. Oldright replied that these diseases were treated more by local municipal officers. Dr. Montizambert described his disinfecting process. He exhausts about one half an atmosphere, then pushes steam into chamber and applies a pressure of one half an atmosphere ; keeps at a temperature between 212° and 239° for half an hour ; then again exhausts, thus drawing steam out of clothing, so that it dries at once without wetting, and does no injury to clothing, except that some inferior qualities of dyes run a little. Dr. Mayer said steam disinfection had been long used in Louisiana. Drs. Baker, Davison, Lewis, La Chapelle, and others participated in discussion. Dr. Durgin said we have injured much clothing. In view of what Dr. Sternberg told us last night of the low temperature at which non-spore-bearing germs are killed, he thought we might trust to lower temperature and shorter exposure than now practised.

Evening.—Dr. Sarah Hackett Stevenson read a paper on "Municipal Sanitation," which was largely directed against dust. She said dust should be burned. School buildings, churches, theatres, etc., should be better cleaned. Streets should be sprinkled before sweeping. Carpet sweepers should be used in the house rather than brooms. Carpets should give place to board floor and rugs. Carpet beating in open air should be prohibited. Heavy window draperies and the heavy upholstering of Pullman cars gather dust, and are unsanitary.

Dr. Abbott read a paper on "National Registration a Necessity," meaning registration of vital statistics. In Massachusetts for sixteen years there has not been a coroner's inquest. The State is divided into some seventy districts, and a medical expert is appointed for each. If he finds occasion for legal examination, he calls on district or other local judge. Connecticut and Rhode Island are the only other States having

such system ; but the abolition of the coroner works well, and is recommended for all. In Massachusetts the death-rate is 18½ ; marriage-rate, 19½ ; birth-rate, 25.

Miss Ada Sweet read a paper on "Voluntary Health and Public Improvement Societies." She said the Municipal Order League was started in Chicago a year and a half ago by women. They found that garbage was dumped in heaps all round the city, some near school-houses. The city now has a small portable furnace, and is beginning to burn the garbage. The next object of attack was waste paper. She advocated free baths, and a beginning had been made in that direction. She urged the general formation of such societies, and told an anecdote of a lady who wrote to her for advice as to securing co-operation of a wealthy citizen who kept his premises in a most unsanitary condition. Miss Sweet replied, "Form a league and elect him president," which was done with success.

"Importance of Civic Public Hygiene to the State" was the subject of a paper by Sir Charles Cameron, of Dublin, read by Dr. Hewitt. It discusses the growth of cities and their higher death-rate, requiring greater care in sanitation. In Dublin within the last ten years he has condemned 2500 unsanitary houses ; sanitary ones at lower rents have superseded them.

"Importance of Sanitary Bureaus—their Economic Organization" was read by Dr. Jesus E. Monjaras, of San Luis Potosi, and "Municipal Sanitation of Minneapolis," by Dr. E. S. Kelly. The latter says that of 38,000 houses, 28,000 have no sewer connection, and yet the death-rate has declined to about 9 per 1000.

On motion of Dr. Hewitt the matter of registration and nomenclature suggested by Abbott and Monjaras in their papers was referred to the Executive Committee.

Friday, October 13th.—Spanish was for the most part the official language of the Congress to-day, and the Republic of Mexico was conspicuously represented among the speakers. But, besides this, at the morning session Dr. Jerome Cochrane, State Health Officer of Alabama, gave an account of an experiment which appears to stand alone in medical history. He told how an epidemic of pneumonia was checked by disinfection. The disease, of a most virulent type, broke out in

one of the two Alabama State prisons in May, 1892. The disease spread in spite of all efforts to combat it, until they decided upon a system of thorough disinfection. Bedding and clothing were drenched in a solution of bichloride of mercury, and mattresses were subjected to the action of heat in a specially constructed steam chamber. The number of cases began to diminish as soon as the disinfection was commenced. Within two weeks not a single case was left.

Dr. Hewitt read a paper on "The Best Way to Restore the Practice of Vaccination to its Proper Place as a Preventive of Small-Pox." He deprecates the prevalent distrust of vaccination, which he attributes to the substitution of calf lymph for arm-to-arm vaccination. Small-pox is to-day, as much as it ever was, the most terrible plague to mankind. Vaccine, introduced by Jenner in Dublin in 1796, has gone continuously through the arms of the children, and is still good.

Dr. Marquez, in his paper on "Animal Vaccine: Why it Should be Preferred to Human Vaccine," called attention to the danger of inoculating other diseases.

Dr. Lee introduced the following, which was unanimously adopted:

"*Resolved*, That the World's Health Congress affirms in the strongest possible manner its confidence in the value of vaccination as a preventive of small-pox."

Dr. Hewitt read the report of Dr. Fomento, as Chairman of the Committee on Yellow-Fever, and requested that the committee be continued, which was so ordered. The means proposed to stamp out yellow-fever are to begin at the centres of infection, of which there are four—Vera Cruz, Colon, Havana, and Rio Janeiro.

Dr. Liceaga read an elaborate thesis entitled "A Contribution to the Study of Yellow-Fever in its Geographical, Medical, and Prophylactic Aspects in the Republic of Mexico." It is noteworthy that he mentioned several centres of infection in Mexico in addition to Vera Cruz, the only one recognized by Dr. Fomento in the committee report just mentioned. All, however, are on the east coast.

Dr. Carmona y Valle read a paper on the "Yellow Coloring of Yellow-Fever Patients," and exhibited a substance obtained from their urine, which he denominates "ichtheroidina."

An invitation to visit the new athletic club room was received from Mr. Clark.

Dr. Monjaras introduced a resolution on the teaching of hygiene in schools, etc., which was referred to the Executive Committee.

Papers were read by Dr. Mendizabal on "The Grip;" by Dr. Macouzer on "Diphtheria in the City of Mexico," and by Dr. Mann on "Notes on the Scarlet-Fever in Mexico."

Dr. Hewitt announced that Mr. Henry Lomb offers a prize of $500 for the best treatise on hygiene and public health, to be used in public schools, with a contingent additional prize of the same amount if valuable contributions on special subjects should be received by the committee.

Dr. Hewitt also introduced the following resolutions, which were unanimously adopted:

"*Resolved*, 1. That this Congress urge upon the people of the countries here represented the important fact that they may complete our sanitary organization by forming voluntary public health associations to study for themselves the conditions of healthy living in the home and the community, and to afford special and persistent support to the work of the officials working in the same direction.

"2. That this Congress respectfully ask State and local boards of health to assist in all proper ways the formation of such associations."

Dr. Oldright read a paper on "Unrest," in which he extolled the rigid Sabbatarianism of his Canadian compatriots.

In the afternoon Dr. Hewitt read a paper by Dr. Benjamin Lee, A.M., Ph.D., Secretary of the State Board of Health of Pennsylvania, on "The Care of Lepers," in which he stated that in ten States and provinces of America 117 cases of leprosy exist. Illinois has two cases. Louisiana has the greatest of any one State—40 cases. He said that, as one case of leprosy outweighed a hundred of any other disease, it was the duty of Congress to take measures to prevent, if possible, a single addition to the horribly afflicted company. The only place in which lepers are isolated and provided with medical attendants and shelter is in Philadelphia.

Dr. Hewitt then read a letter from Dr. Hansen, of Bergen, Norway, in which he shows that the disease is not readily

communicable, and there must be an erosion of the skin to have contagion.

Dr. Hewitt himself, in commenting on the subject, said that the study of leprosy in Minnesota began forty years ago. We have had about forty cases from Norway, and now have sixteen. We have families of four generations living descended from a leper, but none of them leprous. We have not found the disease to be contagious. Most of the lepers would not be recognized as such. There has been no need of segregation.

In their own country Dr. Hansen, the discoverer of the bacillus of leprosy, has charge of them at Bergen. The disease is diminishing in Norway.

A committee appointed in England to investigate the disease went to India, but could not trace any infection. It is vastly less infectious than syphilis and tuberculosis, and is mostly connected with filth.

Papers read by title were, "Sanitation in Greater Britain," by Dr. Renwick; "Sanitation in Japan," by Dr. Kagami, both of the authors being World's Fair Commissioners; and by Mrs. Coleman-Stuckert, on "Co-operative Housekeeping as a Conservator of Nerve Force."

After a short session the Congress proceeded to the World's Fair and visited the Rumford kitchen of Mrs. Richards, where hygienic refreshments were served. The garbage consumer was also visited.

Saturday, October 14th.—A business meeting ended the session.

Officers elected for the ensuing year: Dr. E. P. La Chapelle, of Montreal, President; Manuel Carmona y Valle, of Mexico, First Vice-President; J. M. McCormick, Bowling Green, Ky., Second Vice-President; Henry D. Holton, Brattleboro, Vt., Treasurer; and Irving A. Watson, Concord, N. H., Secretary.

The next meeting of the Association will be held in Montreal in October, 1894. Special committees were appointed on the Pollution of Water Supply, the Disposal of Garbage, Animal Diseases and Foods, Nomenclature, Inoculation as a Preventive of Disease, on Legislation, on Diphtheria, on Tuberculosis, on the Prevention of the Spread of Yellow-Fever, and on Car Sanitation. W. H. H.

MORTALITY AND MORBILITY STATISTICS.

By Harry Kent Bell, M.D.

Alabama.—Jerome Cochrane, M.D., State Health Officer, Montgomery.

Mobile, 31,076 : T. S. Scales, M.D., Health Officer, reports for the month of August a mortality of 52, of which 29 were colored, and 20 were under five years of age. The annual death-rate per 1000 was 20.04.

Zymotic diseases caused 13 deaths, and consumption, 7.

Arkansas.—D. W. Holman, Secretary, Little Rock.

California.—J. R. Laine, M.D., Secretary, Sacramento.

Connecticut.—Professor C. A. Lindsley, M.D., Secretary, New Haven.

Delaware.—E. B. Frazer, Secretary, Wilmington.

District of Columbia, 250,000 : C. M. Hammett, M.D., Health Officer, reports for the five weeks ending September 30th, a mortality of 547, of which number 247 were of colored people, and 215 were under five years of age. The annual death-rate was 19.9 per 1000. There were 165 deaths from zymotic diseases, and 62 from consumption.

Florida.—Joseph Y. Porter, M.D., Secretary, Jacksonville.

The summary, as published in *Florida Health Notes* for the month of July, is as follows :

Number of counties reporting, 35 ; number of cities reporting, 3 ; total population of said counties and cities, 368,037 ; number of births reported, 358 ; number of marriages reported, 322 ; number of deaths reported, 211 ; birth-rate per 1000 per annum, 11.6 ; death-rate per 1000 per annum, 6.88 ; average age of decedents, 27.19 ; number of deaths under five years of age, 75.

Illinois.—J. W. Scott, Secretary, Springfield.

Chicago, 1,575,000 : A. R. Raynolds, M.D., Commissioner,

reports 2573 deaths during August, representing an annual death-rate of 19.6 per 1000.

The mortality under the age of five years was 1507. The deaths from zymotic diseases numbered 931, and from consumption, 166.

INDIANA.—C. N. Metcalf, M.D., Secretary, Indianapolis.

IOWA.—J. F. Kennedy, M.D., Secretary, Des Moines.

KANSAS.—M. O'Brien, M.D., Secretary, Topeka.

KENTUCKY.—J. N. McCormack, M.D., Secretary, Bowling Green.

LOUISIANA.—L. F. Salomon, M.D., Secretary, New Orleans.

New Orleans, 254,000—184,500 white, 69,500 colored. There were reported for four weeks ending September 23, 465 deaths, of which number 233 were among the colored people, and 128 of children under five years of age. There were 81 deaths due to zymotic diseases, and 57 to consumption. The annual death-rate was 24.14 per 1000.

MAINE.—A. G. Young, M.D., Secretary, Augusta.

MARYLAND.—James A. Steuart, M.D., Secretary, Baltimore.

MASSACHUSETTS.—S. W. Abbott, M.D., Secretary, Boston.

Boston, 487,397 : S. H. Durgin, M.D., Chairman.

There were 1069 deaths reported in August, of which number 487 were under five years of age. The annual death-rate per 1000 was 26.33. There were 297 deaths from zymotic diseases, and 113 from consumption.

MICHIGAN.—Henry B. Baker, M.D., Secretary, Lansing.

For the Prevention of Consumption.—At the meeting of the State Board of Health, at the Capitol, September 29th–30th, 1893, the following resolution was adopted :

"*Resolved*, That hereafter consumption (and other diseases due to the *bacillus tuberculosis*) shall be included in the official list of 'diseases dangerous to the public health,' referred to in Sections 1675 and 1676 Howell's Statutes, requiring notice by householders and physicians to the local health officer, as soon as such a disease is recognized.

". . . Many years of experience show that restrictive measures recommended by the State Board of Health, relative to dangerous diseases, have been the direct means of great reductions in the death-rates of dangerous diseases—in some instances the death-rate is only about half what it was before the State Board of Health undertook restrictive measures. If consumption were reported, it could be dealt with in the same manner and restricted, and many cases of consumption avoided every year. It is a disease easily restricted, and the State Board of Health distributes a pamphlet telling just how to do it. If the physicians and citizens of Michigan will do with consumption as they have done in the past with other dangerous diseases, and co-operate with the health officials, much suffering and loss of life can be prevented."

The Board amended its rules for the inspection of immigrants at the Michigan border, by adding to Rule 1, "And no immigrant shall come into this State, or travel within the State, until inspected under these rules, and until authorized to do so by an inspector appointed or accredited by the Michigan State Board of Health."

Rule 5 was amended so as to hold immigrants until their baggage has been disinfected.

An additional rule was adopted, as follows :

"Rule 7. Dangerous communicable diseases being now present in every country from which immigrants are coming into Michigan, no immigrant and no traveller or other person believed by the State Board of Health or by its authorized inspector to have been exposed to and liable to convey cholera, diphtheria, or other dangerous communicable disease, shall pass through Michigan, or from one township, city, or village to another within the State, without permission from the State Board of Health or its authorized inspector."

The following resolution was unanimously adopted :

"*Resolved*, That it is the will of this Board that the Presi-

dent and Secretary continue to take such action as may be necessary to enforce the rules of this Board, and to enforce quarantine at the Michigan border and within the State against diseases dangerous to the public health, and to compel any railroad company operating within the State to obey the State laws and the rules and regulations of the State Board of Health made under the law."

For the month of September, 1893, compared with the preceding month, the reports indicate that dysentery increased, and that inflammation of bowels decreased in area of prevalence.

For the month of September, 1893, compared with the preceding month, the prevailing direction of the wind was west (instead of southeast), the velocity was 48 per cent greater, the temperature was 8.25° lower, the rainfall at Lansing was 1.61 inches more, the absolute humidity was less, the relative humidity was more, the day and the night ozone were much less, and the height of ground above the water in the well at Lansing was five inches more.

Compared with the average for the month of September in the seven years 1886–92, intermittent-fever, remittent-fever, and influenza were less prevalent in September, 1893.

For the month of September, 1893, compared with the average for corresponding months in the seven years 1886–92, the prevailing direction of the wind was west (instead of southwest), the velocity was 10 per cent greater, the temperature was nearly the same, the rainfall at Lansing was .66 of an inch less, the absolute and the relative humidity were slightly less, the day and the night ozone were less, and the height of ground above the water in the well at Lansing was three inches less.

Including reports by regular observers and others, typhoid-fever was reported present in Michigan in the month of September, 1893, at seventy-five places; scarlet-fever, at sixty-seven places; diphtheria, fifty-six; and measles at nine places.

Reports from all sources show typhoid-fever reported at six places less, scarlet-fever at nine places less, diphtheria at twenty-four places less, and measles at seventeen places less in the month of September, 1893, than in the preceding month.

MINNESOTA.—C. N. Hewitt, M.D., Secretary, Red Wing.

St. Paul, 155,000: H. F. Hoyt, M.D., Commissioner, reports for the month of August a total mortality of 176, of which 101 were under five years of age. The death-rate per 1000 was 13.62. The number of deaths from zymotic diseases was 73; from consumption, 3.

Minneapolis, 223,700: E. S. Kelley, M.D., Commissioner.

During the month of August, 1893, there were 223 deaths, representing an annual death-rate of 13.53 per 1000. Zymotic diseases caused 76 deaths, and consumption, 20. There were 108 deaths under five years of age.

MISSISSIPPI.—Wirt Johnson, M.D., Secretary, Jackson.

MISSOURI.—R. C. Atkinson, M.D., Secretary, St. Louis.

NEBRASKA.—F. D. Haldeman, M.D., Secretary, Ord.

NEW HAMPSHIRE.—Irving A. Watson, M.D., Secretary, Concord.

NEW JERSEY.—Ezra M. Hunt, M.D., Secretary, Trenton.

Hudson County, 301,298: C. J. Rooney, Clerk, reports for August 595 deaths, of which 345 were under five years of age. Annual death-rate, 28.1 per 1000.

From zymotic diseases there were 182 deaths, and from consumption, 46.

NEW YORK.—Lewis Balch, M.D., Secretary, Albany, reports in the *Monthly Bulletin* as follows:

The 11,037 deaths during August represent an estimated death-rate of 21.20 for the entire State; for 150 cities, villages, and populous towns having 4,785,000 population it is 22.75, and for the rural portion of the State 15.40. The average daily mortality for the month was 356, which is nearly that for this month in the two years preceding. It has fallen from a daily rate in July of 398, which is customary. There were 1280 fewer deaths reported than in July; a greater diminution than this occurred in the maritime district, but there has been an increased mortality in the Mohawk Valley

and in the western districts. This variation has been chiefly in diarrhœal diseases, which caused hardly half as many deaths in New York and vicinity, while elsewhere it has uniformly increased over July, in the cities and country alike. Of other zymotic diseases, those showing an increase of mortality in all parts of the State are typhoid-fever and whooping-cough, there being also a slight increase in malarial diseases in the maritime district. The customary increase in the mortality from typhoid-fever in August is relatively the same as usual, but the mortality from it both in July and August is less than it was last year ; in cities and villages there were 2.60 deaths per 100,000 population, and in the country, 2.17. The increase in whooping-cough, which caused 129 deaths, is distributed in all parts of the State. Diphtheria caused a less number of deaths (327) than in any month of the year, but is more prevalent than a year ago ; in Jamestown it has been epidemic, and the southern tier district is the only one that shows an increase in mortality from this cause. The mortality from measles (44) is much less than it was a year ago ; it is limited almost entirely to New York City. Deaths from all local diseases are fewer than in July. The rainfall which since May has been deficient, was excessive during August, being above the average by 2.85 inches in the course of the month ; the dew-point and humidity were higher than in July. The temperature has not varied from the normal average of 70°, which is 1° lower than in July ; the ranges were greater in all parts of the State. The prevailing wind was southerly.

New York, 1,860,803 : Total deaths, 3562—1686 under five years. Death-rate, 22.54. Zymotic diseases per 1000 deaths from all causes, 266.70. Deaths from consumption, 418.

Brooklyn, 978,394 : Total deaths, 1955—1043 under five years. Death-rate, 23.23. Zymotic diseases per 1000 deaths from all causes, 313.55. Deaths from consumption, 168.

Syracuse, 91,944 : Total deaths, 152—72 under five years. Death-rate, 19.85. Zymotic diseases per 1000 deaths from all causes, 375.00. From consumption, 19.

Albany, 98,000 : Total deaths, 162—44 under five years. Death-rate, 19.76. Zymotic diseases per 1000 deaths from all causes, 179.00. From consumption, 16.

Buffalo, 300,000 : Total deaths, 741—402 under five years.

Death-rate, 29.64. Zymotic diseases per 1000 deaths from all causes, 483.75. From consumption, 35.

Rochester, 150,000: Total deaths, 235—104 under five years. Death-rate, 18.80. Zymotic diseases per 1000 deaths from all causes, 285.12. From consumption, 19.

NORTH CAROLINA.—Richard H. Lewis, M.D., Secretary, Raleigh.

From the *Bulletin* of the North Carolina Board of Health we find that during August there were 179 deaths in 25 towns, aggregating 124,504 population; 104 were of colored people, and 67 were of children under five years of age.

The annual death-rates were 12.1 per 1000 for the white population, 24.8 for the colored population, and 17.1 for the total. There were 35 deaths from consumption, 13 from typhoid-fever, 11 from malarial fevers, and 33 from diarrhœal diseases.

Asheville, 10,500: Total deaths, 11. Annual death-rate, 12.6 per 1000.

Charlotte, 14,000: Total deaths, 20. Annual death-rate, 17.1 per 1000.

Raleigh, 15,000: Total deaths, 20. Annual death-rate, 16.0 per 1000.

Wilmington, 22,000: Total deaths, 48. Annual death-rate, 26.2 per 1000.

NORTH DAKOTA.—F. H. DeVaux, M.D., Superintendent, Valley City.

OHIO.—C. O. Probst, M.D., Secretary, Columbus.

The *Monthly Sanitary Record* furnished the following report for the month of August: Fifty-three cities and towns, having an aggregate population of 1,206,813, returned 1829 deaths, of which number 810 were under five years of age. The annual death-rate was 16.81 per 1000. Zymotic diseases caused 705 deaths, and consumption, 158.

Cincinnati, 325,000: J. W. Prendergast, M.D., Health Officer, reports for August 442 deaths, of which 179 were under five years of age. Annual death-rate per 1000, 16.32. There were 102 deaths from zymotic diseases, and 43 from consumption.

Mansfield, 15,000 : R. H. Reed, M.D., Health Officer, reports for August 9 deaths, of which 1 was under five years of age. The annual death-rate was 9.6 per 1000.

OKLAHOMA TERRITORY.—J. O. Overton, M.D., Secretary, Kingfisher.

PENNSYLVANIA.—Benjamin Lee, M.D., Secretary, Philadelphia.

Philadelphia, 1,115,562 : M. Veale, Health Officer, reports : In the five weeks ending September 30th, 1893, there were 1871 deaths, of which number 763 were under five years of age. Annual death-rate, 17.5 per 1000. Deaths from consumption numbered 233, and from zymotic diseases, 351.

Pittsburg, 255,000 : J. Guy McCandless, M.D., Registrar, reports : During the five weeks ending September 30th, 1893, there were 485 deaths, of which 247 were under five years of age. Annual death-rate, 19.02 per 1000. Zymotic diseases caused 144 deaths, and consumption, 27.

RHODE ISLAND.—C. H. Fisher, M.D., Secretary, Providence.

According to the reports of the medical correspondents of the State Board of Health, the amount of general sickness in August was no more than the average in the State at large for the same month during the last five years, and rather less than in August, 1892.

Compared with the preceding month, bronchitis, croup, pneumonia, influenza, and tonsilitis were very much less prevalent, were not even named in reports from some localities.

The reports also indicate a lessened prevalence of diphtheria, measles, scarlatina, and whooping-cough, and a slightly increased prevalence of cholera infantum and other diarrhœal diseases.

No epidemic prevalence of any disease reported.

Compared with the corresponding month in 1892, the respiratory and contagious diseases were in about the same measure of prevalence, the diarrhœal diseases rather less frequent and typhoid-fever considerably less in amount in 1893.

Compared with August, 1892, the mean of barometric read-

ings, the mean temperature, the mean relative humidity, and the mean velocity of the wind were almost exactly the same, the mean amount of cloud about one tenth less, and the amount of rainfall one and one sixth inches greater.

The number of deaths recorded in the different towns and cities, from which returns have been received, was 629 in an estimated population of 330,248. Annual death-rate 22.80 per 1000.

SOUTH CAROLINA.—H. D. Frazer, M.D., Secretary, Charleston.

SOUTH DAKOTA.—C. B. Alford, M.D., President, Huron.

TENNESSEE.—J. Berrien Lindsley, M.D., Secretary, Nashville.

The principal diseases, named in the order of their greater prevalence, in the State for the month of August, were: Malarial-fever, typhoid-fever, dysentery, consumption, diphtheria, scarlet-fever, whooping-cough, cholera morbus, diarrhœa, cholera infantum, bronchitis, mumps, and rheumatism.

Chattanooga, 27,000 white and 13,000 colored: Total deaths, 52—37 of which were colored, and 23 under five years of age. Annual death-rates, 6.6 for the white population, and 34.15 for the colored, per 1000.

Memphis, 33,800 white and 27,700 colored: Total deaths, 82—45 of which were colored, and 27 under five years of age. Annual death-rates, 13.12 white, and 19.49 colored, per 1000.

Knoxville, 31,273 white and 9112 colored: Total deaths, 56—18 of which were colored, and 20 under five years of age. Annual death-rates, 14.5 white, and 23.70 colored, per 1000.

Nashville, 54,595 white, 33,159 colored: Total deaths, 148—83 of which were colored, and 20 under five years of age. Annual death-rates, 14.23 white, and 30.03 colored, per 1000.

WASHINGTON.—G. S. Armstrong, M.D., Secretary, Olympia.

WEST VIRGINIA.—N. D. Baker, Secretary, Martinsburg.

WISCONSIN.—J. T. Reeve, M.D., Appleton.

Milwaukee, 250,000: U. O. B. Wingate, M.D., Commissioner.

PROVINCIAL BOARD OF HEALTH OF ONTARIO.—Peter H. Bryce, M.D., Secretary, Toronto.

PROVINCE OF QUEBEC.—Elzear Pelletier, M.D., Secretary, Montreal.

BUENOS AYRES, 567,408: Albert B. Martinez, Director-General of Municipal Statistics.

There were 1183 deaths during July, of which number 603 were under five years of age.

From epidemic diseases there were 111 deaths; from meningitis, 58; from bronchitis, 54; from pneumonia, 115, and from consumption, 84.

DIPHTHERIA IN NOVA SCOTIA.

In the September SANITARIAN Dr. Wyman, head of the Quarantine and Marine Hospital Service of the United States, says: "Diphtheria, scarlet-fever, typhoid-fever, and measles are actually more destructive of human life than cholera and other so much dreaded epidemic horrors, and that any community can easily prevent their spread."

In 1891 diphtheria appeared in a small town in the West, and two deaths occurred from it. Those in authority proved their great business foresight and humanity by at once quarantining the place, and instituting measures which promptly proved successful in stamping out this horrible disease. All the faculties of our cities preach with one voice what this little town alone practised. God bless the men of that obscure village, who have such clear heads and such warm hearts. Let us bow before them with shame at our hypocrisy and cruel meanness. No wonder the West grows so fast that the railroads can hardly move her products to market, when she exhibits examples of such practical knowledge in protecting the health and lives of her citizens as her primary resources. During one of the regular plagues of typhoid-fever, which has affected a Nova Scotia town for over a generation, one of her

citizens takes a trip to a town in Colorado ; upon his arrival he is stricken down and dies of typhoid-fever. Doubtless he had the germs of the fever in his system when he left Nova Scotia. The officials of this Nova Scotia town, from ignorance of sanitary laws or culpable neglect to keep it clean, nourished this disease and shipped it direct to the Colorado town to endanger the lives of the people there, and through them others of the State and of the United States. How can it be otherwise, until those places which, from ignorance, neglect, or parsimony remain breeding grounds for disease, are boycotted by the rest of the world which keeps itself decently clean. It was reported several years ago that the deaths from diphtheria had risen to two thousand a year in Nova Scotia. The germs of the disease are scattered all over the country, insomuch that it now has a prevalence comparable to that of yellow-fever in its tropical habitudes, and is tolerated with the same disregard for the health and prosperity of the people. E. P. McCLEAN.

NEW GLASGOW, N. S., September 12th, 1893.

MORTALITY STATISTICS ABROAD FOR THREE MONTHS ENDING JUNE 30TH, 1893.

Population, total number of deaths, annual death-rate per 1000, and deaths from small-pox :

London, 4,305,551 ; 20,882 ; 19.4 ; 100. Glasgow, 677,883 ; 4150 ; 24.5 ; 10. Liverpool, 515,507 ; 3445 ; 26.7 ; 1. Manchester, 510,486 ; 3129 ; 24.5 ; 17. Birmingham, 487,897 ; 2397 ; 19.8 ; 19. Leeds, 382,094 ; 1993 ; 20.9 ; 3. Dublin, 349,594 ; 2283 ; 25.9. Sheffield, 333,922 ; 1717 ; 20.6 ; 4. Edinburgh, 265,672 ; 1198 ; 18.0. Belfast, 265,123 ; 1597 ; 24.1. Bristol, 225,146 ; 962 ; 17.1 ; 1. Bradford, 221,611 ; 1066 ; 19.2 ; 19. Nottingham, 220,551 ; 806 ; 14.6 ; 2. Hull, 208,639 ; 894 ; 17.1 ; 6. Salford, 203,427 ; 1135 ; 22.3 ; 11. Newcastle, 197,026 ; 997 ; 20.2. Portsmouth, 167,284 ; 646 ; 15.4. Norwich, 104,176 ; 406 ; 15.6. Paris, 2,424,705 ; 15,169 ; 25.0 ; 49. Lyons, 438,077 ; 2834 ; 25.9 ; 1. St. Étienne, 133,443 ; 796 ; 23.9 ; 1. Nantes, 127,482 ; 986 ; 30.9 ; 1. Havre, 116,369 ; 955 ; 32.8 ; 1. Reims, 105,408 ; 780 ; 29.6. Nice, 97,720 ; 573 ; 23.5. Nancy, 87,110 ; 768 ; 35.3 ; 1.

Limoges, 72,697 ; 483 ; 26.6. Besançon, 54,636 ; 516 ; 37.8 ; 1. Berlin, 1,714,938 ; 8789 ; 20.5. Hamburg, 581,608 ; 2941 ; 20.2 ; 3. Leipzig, 388,479 ; 2184 ; 22.5. Munich, 380,000 ; 2564 ; 27.0. Breslau, 324,143 ; 2669 ; 32.9. Dresden, 304,519 ; 1956 ; 25.7. Cologne, 297,000 ; 2317 ; 31.2. Magdeburg, 224,303 ; 1106 ; 19.7. Frankfort, 193,144 ; 978 ; 20.3. Hanover, 175,920 ; 861 ; 19.6. Königsberg, 167,099 ; 969 ; 23.2. Düsseldorf, 159,858 ; 947 ; 23.7. Nuremberg, 156,902 ; 858 ; 21.9. Altona, 153,490 ; 724 ; 18.9. Chemnitz, 152,004 ; 1118 ; 29.4. Elberfeld, 134,745 ; 674 ; 20.0. Stuttgart, 134,517 ; 686 ; 20.4. Bremen, 131,082 ; 594 ; 18.1. Dantzig, 124,849 ; 651 ; 20.9. Stettin, 123,198 ; 873 ; 28.3. Crefeld, 113,198 ; 631 ; 22.3. Halle, 111,435 ; 597 ; 21.4. Aix-la-Chapelle, 107,472 ; 794 ; 30.0. Essen, 85,753 ; 550 ; 25.7. Brussels, 488,188 ; 2902 ; 23.8 ; 6. Berne, 47,620 ; 297 ; 24.9. Basle, 75,114 ; 382 ; 20 3. Geneva, 78,777 ; 466 ; 23.7. Lausanne, 35,623 ; 279 ; 31 3. Zurich, 103,271 ; 598 ; 23.2. Chaux-de-Fonds, 27,511 ; 146 ; 21.2. Vienna, 1,435,931 ; 9729 ; 27.1 ; 15. Buda-Pesth, 539,516 ; 3873 ; 28.7 ; 6. Prague, 322,910 ; 1999 ; 24.8 ; 45. Trieste, 158,-549 ; 1005 ; 25.4 ; 63. Lemberg, 131,129 ; 888 ; 27.1 ; 3. Gratz, 115,006 ; 949 ; 33.0. Brünn, 96,761 ; 759 ; 31.4. Cracovie, 77,144 ; 847 ; 43.9 ; 76. Debreczin, 60,476 ; 536 ; 35.5. Presbourg, 57,190 ; 543 ; 38.0 ; 1. Pilsen, 52,406 ; 331 ; 25.3. Linz, 48,868 ; 368 ; 30.1. Copenhagen, 334,000 ; 1756 ; 21.0. Stockholm, 249,246 ; 1306 ; 21.0. Gothemburg, 108,969 ; 429 ; 15.74. Christiania, 156,500 ; 671 ; 17.2. Moscow, 753,469 ; 6438 ; 34.2 ; 43. Warsaw, 500,931 ; 2693 ; 21.5. Turin, 335,126 ; 1627 ; 19.4 ; 1. Genoa, 200,495 ; 340 ; 26.7 ; 4. Venice, 162,326 ; 1104 ; 27.2 ; 4. Bologne, 141,750 ; 883 ; 24.9. Jassy, 80,196 ; 481 ; 24.0. Algiers, 75,432 ; 696 ; 36.9 ; 105.

Railway Accidents.—The number of railway employés killed in the United States during the year ending June 30th, 1893, was 2554, being less than the number killed during the previous year. The number of employés injured, however, was in excess of the number injured during the previous year, being 28,267. The number of passengers killed was largely

in excess of the number killed during the previous year, being 376 in 1892 as against 293 in 1891 ; while the number of passengers injured was 3227 in 1892, as against 2972 in 1891. An assignment of casualties to the opportunity offered for accidents shows one employé to have been killed for every 322 employés, and one employé to have been injured for each 29 men in the employ of the railways. A similar comparison shows one passenger killed for each 1,491,910 passengers carried or for each 35,542,282 passenger miles, and one passenger injured for each 173,833 passengers carried or each 4,140,966 passenger miles. The largest number of casualties to employés resulted from coupling and uncoupling cars, 378 employés having been killed and 10,319 injured while rendering this service. Of the total number killed in coupling and uncoupling cars 253, and of the total number injured 7766 were trainmen. The accidents classed as "falling from cars" were in this year as in previous years responsible for the largest number of deaths among employés, the number killed in this manner being 611. Of this number 485 were trainmen. Collisions and derailments were responsible for the death of 431 employés. Of this number 336 were trainmen. This class of accidents is responsible also for the largest number of casualties to passengers. Thus 177 passengers were killed and 1539 were injured by collisions and derailments during the year. Collisions alone were responsible for the death of 286 employés and 136 passengers.

The total number of employés in the service of railways on June 30th, 1892, was 821,415, being an increase of 37,130 over the previous year. Assuming an increase in the total number of inhabitants during the year of 1,250,000, it appears that the ratio of increase in railway employés to the increase in population was 1 to 34. The ratio of total railway employés to total number of inhabitants was 1 to 79. The railway industry makes each year larger demands upon the labor of the people. It is significant, however, to notice that the most of the increase in railway employment is confined to Groups I., II., III., VI., and X.—that is to say, to the territory east of the Mississippi and north of the Ohio rivers and to the Pacific slope. In Groups IV. and VIII. there has been only a slight increase, while Groups V., VII., and IX. show

small decreases in the number of men employed by railways. —*Statistics of Railways, Interstate Commerce Commission Report*, 1893.

REPORT OF THE MEDICAL OFFICER OF THE BRITISH LOCAL GOVERNMENT BOARD, 1889–92. Two volumes, pp. 165–228, and numerous tables and plates. Further Report and Papers on Epidemic Influenza, by Drs. Parsons and Klein, and the Work of the Board for the year ending with Dr. George Buchanan's service, March, 1892, with an Introduction by Dr. R. Thorne Thorne, Dr. Buchanan's successor.

Dr. Thorne pays a well-merited tribute to his predecessor, who had been in the service of the Board, either as Medical Inspector or as the Board's Medical Officer, continuously for more than thirty years. This period of service by Dr., now Sir George Buchanan, corresponds with the progress that has been made in the practical application of preventive medicine as reorganized under the direction of the Privy Council in 1859 by Sir John Simon, after whom it was maintained for a brief term by the late Dr. Seaton, to whom Dr. Buchanan succeeded in 1880, and of whom Dr. Thorne says: "Those alone who have had the opportunity and the pleasure of working under his direction can appreciate to the full the important influence for good which his labors have had; and they alone can realize how much the Medical Department owes to the example which he set as an earnest worker and director, who never ceased to claim that all true sanitary progress must be based on accurate and scientific research in the etiology of disease."

Since the issue of Dr. Parsons's first report on the influenza epidemic, 1889–90, under the direction of Dr. Buchanan, the mortality returns for England and Wales during 1890–91, and for London, 1892, have become available, and used in this "further report." Three epidemic periods are considered: First, that of the winter 1889–90; secondly, that of April–June, 1891; and, thirdly, that of the winter 1891–92. In the metropolis the death-rates from influenza per million living for these periods, respectively, were 146, 544, and 531.

With regard to the mortality by this disease in different communities, it is noteworthy that the death-rate was sub-

stantially greater in rural and sparsely populated areas than it was in large towns. Thus, whereas in the metropolis and in 90 towns having populations varying from 20,000 to 80,000 each, the death-rate varied from 0.52 to 0.58 per 1000 living, the rate on nearly 3,000,000 people living in 192 rural sanitary districts reached 0.73 per 1000.

The further experience which has been obtained goes strongly to confirm the view that influenza is essentially propagated from person to person—contagious.

During both 1890 and 1891 the death-rate from influenza was greater among males than females, and this especially at the middle period of life ; and having regard to the serious influence of the disease on the nervous system, it is highly probable that this result may be mainly due to the fatigue, mental as well as physical, and to the exposure to which men are more especially subjected.

Having regard to the published observations of Pfeiffer and Kitasato, on the constant and copious occurrence of a species of minute bacillus, in the bronchial secretion of cases of influenza, as also to the observations of Canon on the occurrence of bacilli in the blood of influenza cases, in January, 1892, Dr. Klein was instructed to undertake special investigations in the same direction, and to employ such assistance as he deemed necessary. . . .

Dr. Klein concludes that although bacteria, which he accepts as the bacilli of influenza, do at times appear in the blood, yet he is of opinion that they do not occur in that fluid with any constancy, and that they rapidly lose their vitality after gaining access to the circulation ; . . . that the blood cannot in any sense be regarded as the primary nidus of the microbe of influenza.

Examination of the bronchial sputum in influenza led to very different results. Minute non-mobile bacilli, having a characteristic appearance, appear in greater or less amount in the sputum of all cases of influenza. During the acute stage of the disease they are generally present in abundance, occasionally almost in pure culture ; and they tend to disappear as the disease passes off. These bacilli, which are the same as those described by Pfeiffer and Kitasato, do not occur in the bronchial secretion of any other disease ; they must be

regarded as pathognomonic of influenza ; and their life history conforms, as Dr. Klein puts it, with what we believe to be the facts about the contagium of the disease.

One prominent lesson seems indicated as the result of Dr. Klein's study of influenza from the bacteriological point of view. It is this : The sputa of the sick are, especially in the acute stages of the disease, invariably charged with the micro-organism which is pathognomonic of influenza, and it may be hoped, therefore, that when these sputa come to be recognized as infectious, and are dealt with as is held necessary in the case of discharges from the throat, mouth, and nostrils of scarlatina and diphtheria patients, the spread of influenza from person to person may be to a corresponding extent controlled.

The administrative work of the Board for 1892 comprises the digest of the vaccination officers' returns, and other reports on vaccination and the means of promoting it. The sittings of the Royal Commission on Vaccination, which commenced June 26th, 1889, and have been almost continuously engaged since that date, are still in progress.

Numerous conferences were held with and detailed local investigations made by the Board's officers on the means of isolation for the infectious sick and the prevention of outbreaks in the districts concerned.

Among a dozen special reports of investigations that follow, all of interest to sanitarians, Dr. Bruce Lowe gives an account of an anomalous illness that prevailed in Northamptonshire characterized by pneumonia, sometimes by meningeal symptoms, and frequently associated with tonsilitis or sore throat. Certain of these cases had much in common with sporadic cases of cerebro-spinal-fever that prevailed in some of the Eastern counties during the previous year.

An outbreak of scarlet-fever at Enfield and Edmonton, investigated by Dr. S. Monckton Copeman, was attributed to a milk supply which was derived from a farm at some distance from Essex, where attacks of the same disease occurred among consumers of milk from the same farm. No infection of the milk from a human source could be made out, but the cows were found to be suffering from udder eruption. Dr. Klein found, by cultures on gelatine, a non-liquefying microbe was the predominant organism, similar to the streptococcus iso-

lated by him from sores on Hendon cows in 1885, but the present organism inoculated into mice proved only doubtfully pathogenic, and inoculation of calves with matter from this eruption gave negative results.

But the most comprehensive and suggestive of the special investigations of the year is on

Manure Nuisances, by Dr. Parsons. Numerous complaints having reached the Board from various quarters as to nuisance and injury to health in connection with the transport of town manure into agricultural districts, Dr. Parsons was instructed to inquire into the circumstances of the traffic, and the result is an exhaustive report which should not fail to attract the attention of health authorities everywhere. The subject is not a new one to the readers of THE SANITARIAN, but the conclusions of this report—after the most searching investigation—more than confirm all that we have ever said of its danger to health, and particularly at our own doors, in Brooklyn, where the health authorities ignore it.

"London manure occupied a prominent position in connection with these reports. It is, as a rule, entirely free from human excreta, but it is otherwise a compound of nearly every form of animal and of some forms of vegetable refuse; such materials as dead and putrefying animals, fish guts, paunches, etc., being mingled with stable manure, cabbage stalks, rotten vegetables, etc. And the diseases which were most commonly regarded as being referable to the offensive emanations were diphtheria and allied sore throat."

The conclusions are:

"1. The manure traffic, although lawful and necessary in the interests of both town and country districts, often occasions serious nuisances and sometimes injury to health.

"2. The diseases which have been thought capable of being produced or conveyed by town manure are:

"(1) General malaise, vomiting, diarrhœa.

"(2) Sore throat (follicular tonsilitis).

"(3) Diphtheria.

"(4) Enteric-fever (when human excreta are contained in the manure, and especially when water sources are contaminated by it).

"(5) Other infective fevers.

"(6) Septicæmia, etc.

"3. Although London manure is practically free from human excrement, yet much of it is of a very offensive character, largely due to its containing food refuse and waste animal matters, and to the length of time occupied in its transit.

"4. The principal nuisances arising from the manure traffic in the districts to which it is consigned are caused by :

"(*a*) The unloading of trucks and barges in improper situations, as near houses or in frequented places.

"(*b*) Deposit and storage of manure near houses.

"(*c*) Careless carting, allowing effluvia to escape, and the manure to drop on the highways.

"(*d*) Careless disposal of manure on land near houses.

"5. To a great extent these nuisances already are under the control of local authorities through the provisions of the Public Health Acts, or through by-laws which may be made thereunder ; but in agricultural districts and small market towns there is often an indisposition on the part of local authorities to exercise the powers which they possess for their repression.

"6. The directions in which further legal powers appear desirable are :

"(*a*) An extension of the scope of by-laws under Section 44, Public Health Act, 1875, to include putrescible refuse matters other than fœcal.

"(*b*) The power, if it do not already exist, to prohibit the unloading of manure in the immediate neighborhood of inhabited buildings, either generally within a specified distance, or in any particular instance upon proof of nuisance."

The Registrar's Quarterly Returns for Ireland, during the quarter ended June 30th, were, in the 799 Registrars' Districts, 28,301 births—a number equal to an annual birth-rate of 24.5 in every 1000 of the estimated population—and 20,306 deaths, representing an annual rate of 17.6 per 1000.

The birth-rate for the quarter is 0.1 under the average rate for the corresponding quarter of the last 10 years, but 0.2 over the rate for the second quarter of 1892. The deaths are below those regis ered in the corresponding quart r of 1892 to the extent of 2840 ; the death-rate is 2.4 below the rate for that quarter and 1.8 below the average for the secon l quarter of the 10 years 1883–92.

EDITOR'S TABLE.

SANITARIAN, NOVEMBER NUMBER, 1893.

☞ ALL correspondence and exchanges and all publications for review should be addressed to the Editor, DR. A. N. BELL, Brooklyn, N. Y.

THE YELLOW-FEVER OUTBREAK at Brunswick, Ga., early in August, and the terribly inviting conditions for its propagation, brought about by the devastating cyclone that shortly after occurred, among the destitute and half-starving negroes on the sea islands of Georgia and South Carolina, is a melancholy reminder to the sensible people of those States, which have health laws on their statute books, but lawmakers so ignorant of or so obtuse to such dangers as to wholly rely upon voluntary service to execute them. Fortunately the United States Marine Hospital Service is empowered to contend with such emergencies at public expense, but no power to relieve the destitution which they involve, or to provide against the sustained liability to their recurrence.

The popular error that negroes are not subject to yellow-fever, particularly when, as in this epidemic, they are found to be ill-fed and disheartened by calamity, is signally exposed : the proportion of cases among the negroes, probably on account of their more miserable condition, being even greater than among the white people ; and, considering the destitution and unsanitary surroundings of the ten thousand or more of them on the sea islands, unless a good deal more is done than has yet been to relieve their necessities, yellow-fever will falsify its history if it does not take advantage of its opportunity on the return of hot weather, to show that it can afford to sleep through one winter at least without losing its vitality.

CHOLERA still keeps up its contest with the health authorities of Europe, though it makes but little headway. This is particularly the case in Spain and Holland, where it has cropped out in several districts widely distant from one another with a few cases in each daily—just enough apparently to admonish the health authorities of its presence. In Italy,

Palermo, Leghorn and Naples it still lingers, but it is waning, and there have been no new outbreaks during the last month. At Stettin it is reported to be on the increase—five new cases with two deaths reported October 16th. But Professor Koch, who had visited the city and examined the cases, declared that the disease was not epidemic at that port, and that in his opinion it would shortly disappear. "Choleraic disease" has been reported prevalent in Charleroi district of Belgium. Berlin and London each have had a few cases, and a "choleraic disorder" has broken out in the workhouse at Greenwich with such fatality as to create considerable alarm, insomuch that the authorities of Lisbon have declared both London and Greenwich to be infected with cholera. In Russia there is a very large number of cases, with a heavy mortality. Moscow, Kieff, Podolia, and Nijni Novgorod are the most severely afflicted, having had a total of about seven hundred deaths a week for the last month, with a constantly increasing number of cases throughout the provinces. So far the quarantine station at El Tor has been remarkably free from the disease, and but one case has occurred among the pilgrims.

THE TYPHUS BACILLUS DISCOVERED.—Professor Dr. Fraenckel, of Berlin, announces that he has discovered a typhus bacillus; and that by using this bacillus in vaccination, he has produced a rapid, benign course of the fever. Professor Dr. Rumpf has cultivated an anti-fever bacillus which, he says, will cure typhus in eight days.

CHANDELEUR ISLAND QUARANTINE STATION AND LIGHTHOUSE COMPLETE WRECKS by the storm of October 1st and 2d. According to the report of the disaster in the New Orleans *Times-Democrat* of October 7th, every building on the island has been swept away. Three out of nine souls who were on the island perished in the sea. Bayous and channels, some ten and twelve feet in depth, have been washed through the island, and it will be impossible for the Government to again make use of that place for its quarantine station.

Dr. Guiteras, the Quarantine Officer in charge, gave a statement of how the island was swept by the storm, as follows:

"At the outset of the gale the wharves were washed away, and communication between the lower and upper buildings was cut off. The steward was in his quarters, and in the wards were two patients and two nurses. The steward was drowned.

"When the gale was at its height the female quarters went by the board. Dr. Guiteras was in his quarters, at the time, and went at once to the rescue of the two women, one a nurse and the other a laundress. He had to wade up to his neck in water the entire distance, and at the peril of his life took the women to his house. He signalled for the whaleboat, then at the lighthouse, and the keeper and his assistant put out for the three men on the island. They were taken into the whaleboat and brought to the lighthouse, where they remained until the storm abated, when they were transferred to Biloxi. While at the lighthouse Dr. Guiteras saved the life of a Manilla man, whom he found in the water.

"All of the drowned people on Chandeleur Island were males, the nurses being men assigned to care for that section of the station.

"Dr. Guiteras has ordered his assistant, Dr. Charles Peleaz, to Ship Island, where a temporary quarantine station will be established. He has notified his headquarters at Washington of the full particulars, and will remain on the scene until ordered to take other action."

For this disaster responsibility chiefly rests upon ex-Surgeon-General J. B. Hamilton, of the U. S. Marine Hospital Service.

In September, 1879, it was made the duty of this writer, as Quarantine Inspector under the National Board of Health, to designate the site for a quarantine station in the Mississippi Sound, as a refuge for vessels subject to quarantine bound to or sent from the harbors on the Gulf Coast in that vicinity. After careful examination of the premises, considering the height of surface above sea level, stability of soil as indicated by the vegetation, depth of water, accessibility and relative protection of vessels at anchor (as indicated by Coast Survey chart), in comparison with the other islands off that coast, and after consulting the judgment of the merchants of New Orleans, *Ship Island* was chosen. It was soon afterward partially equipped and utilized.

But no sooner had Dr. Hamilton succeeded in his effort to supersede the National Board of Health, than he determined to assert his superior knowledge of this, as of other effective

work of the National Board. Claiming that this site was too far distant from the Mississippi Quarantine, where the State authorities (of Louisiana) never had and have not since shown any disposition to accept the offices of the Marine Hospital Service, and assuming without knowledge that Chandeleur Island was a better site, he proceeded to act accordingly, despite the expressed preference of the merchants of New Orleans, and the report of Captain Thomas W. Lay, of the Revenue Marine, on examination made by order of the Secretary of the Treasury, of which the following is an abstract :

"After a full consideration of all the requirements of a quarantine station, . . . we have decided to recommend Ship Island, in Mississippi Sound, as the best located and only island that possesses these advantages. . . . I will also state that there is no other island in the vicinity of the passes, within my knowledge, that can be used as a quarantine station." Evidence furnished the Public Health Committee of the House of Representatives (*National Board of Health Report*, 1879, p. 466, and SANITARIAN, Vol. XII., p. 328).

That there will be any effort to re-establish the quarantine at Chandeleur is not to be believed of the present Surgeon-General of the Marine Hospital Service.

STABLE MANURE has been the subject of special investigation by the Local Government Board of England, and for the results of this investigation the reader's attention is invited to our review of the report under the head of Mortality and Morbility Statistics, on other pages.

Manifestly, storing manure in vaults under the pavements, and in basement areas along the outside of the stable walls until it putrefies, and then delivering it across the pavements to carts in the streets, scattering it roundabout, as commonly practised in Brooklyn, is not only an offensive nuisance throughout the city, but a suggestive source of the chronic epidemic of diphtheria, the constant prevalence of sore throats and other manure diseases enumerated in the category referred to, common to Brooklyn and discreditable to the health service.

OBITUARY.

JOHN W. BRANHAM, Assistant-Surgeon United States Marine Hospital Service, died of yellow-fever at Brunswick, Ga., August 20th. He was taken ill about August 10th, while in the performance of quarantine duty at Brunswick, and died on the afternoon of the 20th.

Assistant-Surgeon Branham was born in Walker County, Ga., October 27th, 1868, and his early education was derived from the schools of his native State. When he was thirteen years of age he moved to Baltimore, Md., and received a general education at the Baltimore City College. He then studied medicine at the College of Physicians and Surgeons, Baltimore, and graduated at the head of his class from that institution, March 13th, 1889. During this time his elder brother, Dr. J. H. Branham, of Baltimore, was his preceptor. After graduation he first served as resident physician at the City Hospital in Baltimore during part of 1889 and 1890, and afterward was assistant quarantine physician for the port of Baltimore from May until November, 1891. Leaving Baltimore he moved to Kempsville, Va., where he practised medicine until entering the medical corps of the Marine Hospital Service. At the examination of candidates held in Washington, D. C., in March, 1893, Dr. Branham passed first among twenty-two applicants, and was commissioned Assistant Surgeon, April 19th, 1893, and on April 21st was ordered to the Marine Hospital, Stapleton, S. I. On July 25th Assistant-Surgeon Branham was ordered to Brunswick, Ga., to take charge of the quarantine at that port, where he remained in the active discharge of that duty until he was stricken down with yellow-fever.

Surgeon-General Wyman pays the following fitting tribute: "As an officer Assistant-Surgeon Branham was held in high esteem, both by those under whom he served and by the Department. His ability was fully recognized, and he was chosen for the important duty of reorganizing the quarantine of Brunswick and establishing it upon a firm sanitary basis,

the local quarantine at that point having proved to be insufficient. Through his death the service has lost an able officer.

"Personally Assistant-Surgeon Branham was a man whose general education and medical attainments won for him the highest respect, and his social relations with his brother officers and others were characterized by a manliness of deportment and gentlemanly bearing that won the affection of all."

On the announcement of the death of Dr. Branham, the New York *Medical Journal* takes occasion to refer to other medical officers of the Marine Hospital Service whose lives have been sacrificed under similar circumstances, and to the injustice of the National Government in not having provided a pension for the dependent relatives of such officers.

Other officers of the Marine Hospital Service who have died of yellow-fever acquired at their stations are called to mind, as follows:

Assistant-Surgeon Roswell Waldo, at Cairo, on October 18th, 1878; Assistant-Surgeon W. C. W. Glazier, at Key West, in December, 1880; and Assistant-Surgeon John F. Groenevelt, at Chandeleur Island Quarantine, on June 29th, 1891. To these may be added the death, in 1889, of Passed Assistant-Surgeon F. M. Urquhart, whose illness was the result of exposure and overwork incident to quarantine duty.

From 1878 to 1893 inclusive, five officers have died of disease incurred in the line of duty, in a corps that does not attain a total, in the fifteen years, of a hundred officers. The mortality among the officers is greater from this cause than from all others put together. Besides these deaths, several officers on quarantine duty have been dangerously ill, but have recovered.

The medical officers of the Marine Hospital Service, in the exercise of the duties devolved upon them by recent laws, in fighting against the invasion of epidemic diseases, are engaged in a service no less noble nor less liable to disease and death than are the officers of the Army and Navy in the exercise of their duties; and in case of death under such circumstances, a pension is no less justly due the dependent relatives of the former than the latter.

We are gratified to learn that a movement is on foot to cor-

rect this injustice. It is eminently worthy of the support of every good citizen.

Dr. W. H. Galt, for several years City Health Officer of Louisville, Ky., and a member of the Faculty of the Louisville Medical College, died September 14th, in that city, of erysipelas. He was 65 years of age. Dr. Galt was prominent as a health official and a physician of deservedly high repute.

BIBLE STATISTICS.

In the Bible the word Lord is found 1853 times ; the word Jehovah 6855, and the word reverend but once, and that in the 9th verse of the CXI. Psalm. The 8th verse of the CXVII Psalm is the middle verse of the Bible. The 9th verse of the VIII. chapter of Esther is the longest verse ; 35th verse, XI. chapter of St. John, is the shortest. In the CVII. Psalm four verses are alike, the 8th, 15th, 21st, and 31st. Each verse of the CXXVI. Psalm ends alike. The XXXVII. chapter of Isaiah and the XIX. chapter of 2d Kings are alike. The word girl occurs but once in the Bible, and that in the 3d verse and III. chapter of Joel. There are found in both books of the Bible 3,586,473 letters, 773,693 words, 31,373 verses, 1180 chapters, and sixty-six books. The XXVI. chapter of the Acts of the Apostles is the finest chapter to read. The most beautiful chapter in the Bible is the XXIII. Psalm. The four most inspiring promises are John XIV. chapter and 2d verse, John VI. chapter and 37th verse, St. Matthew XI. chapter and 28th verse, and XXXII. Psalm 4th verse. The 1st verse of the LX. chapter of Isaiah is the one for the new convert. All who flatter themselves with the vain boasting of their perfections should learn the VI. chapter of St. Matthew. All humanity should learn the VI. chapter of St. Luke, from the 20th verse to its ending.

The above data are said to have been first found scratched with a nail on the rough wall of the cell in which the learned Prince of the ancient Kingdom of Grenada, rightful heir to the Spanish throne, died, after thirty-three years solitary confinement by order of the crown, in the old prison at the Place of Skulls, Madrid.

NEW BOOKS AND BOOK REVIEWS.

ANY BOOK reviewed or advertised in THE SANITARIAN costing $1.50 or less will be sent *free* to any present subscriber sending the name of a new subscriber, or to any new subscriber on receipt of the full subscription price sent on his own account; or any book so reviewed or advertised costing more than $1.50 will be sent at a discount of that amount.

OUTLINES OF PRACTICAL HYGIENE ADAPTED TO AMERICAN CONDITIONS. By C. GILMAN CURRIER, M.D., Visiting Physician to the New York City Hospitals; Fellow of the New York Academy of Medicine; Member of the New York Pathological Society; Member of the American Medical Association, etc. 8vo, pp. 468. Illustrated. Price, $2.75. New York: E. B. Treat, Cooper Union.

Hygiene is a synonym of preventive medicine. It comprises the knowledge of preventable diseases and their causes, of the means of their prevention, and how to apply those means to all conditions in conflict with health everywhere.

The work before us treats of Soil, Climate, Protection of Body, Clothing, Bathing, Personal Hygiene, Physical Exercise, Schools, Occupations—their Influence on Health, Heating, Lighting, Buildings, Ventilation, Diet, Foods—their Preparation and Adaptation, Water and Water Supplies, Fluid Waste, Sewers, Drainage, Plumbing, Garbage and Other Refuse, Disposal of the Dead, Disposal of Human Excreta, Bacteria and Disease, Infectious Diseases, Disinfection, Restriction of Communicable Diseases—in as many chapters.

There are some important omissions in the consideration of these subjects which we greatly prefer to think inadvertencies rather than unadaptable, by an author of such accomplishments, to "American conditions." For example, the first chapter, "On the Soil;" no notice is taken of the relation of soil temperature to infantile diarrhœa, the most common and the most fatal epidemic of American cities. Dr. Ballard, of the Local Government Board, London, has clearly demonstrated that the cause of epidemic infantile diarrhœa exists in the superficial layer of the soil, in microbic life amid the

putrescible matter of such soil roused into activity by the heat and moisture within four feet of the surface. That although infantile diarrhœa, commonly called cholera infantum in America, is not strictly limited to any season of the year, it is never epidemic except during the summer months ; and that its increase and decrease are coincident with the rise and fall of the soil temperature. It commonly reaches its maximum in prevalence and mortality when a *four-foot earth thermometer* shows a temperature of about 56° F. (13° C.), no matter what the temperature of the air may be ; and the decline of mortality coincides with the decline of the earth temperature, frequently not until several weeks after autumnal decline of atmospheric temperature. It seems hardly necessary to add that currents of ground air constantly rising from such soil may carry the microbes into the atmosphere roundabout, from which they are ever liable to settle in food or drink, magnifying their danger.

Bathing and personal hygiene are imperfectly treated in the chapters so headed. "Tub baths of warm water are the most effective, . . . as the agreeable temperature of the water *allows one to remain in the bath for some time.*" The *italics* are ours for the purpose of calling the reader's attention to the ill effects common to such indefinite qualifications as "some time," and to the too great indulgence in the warm bath ; particularly by children left to the indiscreet care of nurses, who rarely recognize the difference between warm and hot baths, 92° to 98° and 98° to 112° F., respectively, and know nothing about the tepid bath, 85° to 90°, which is more salutary in its effects, particularly in the nursery, than either the warm or hot. The relaxing effect of the habitual use of the warm bath for more than fifteen minutes at a time, and the increased tenderness to exposure which it induces, is recognizable by all good observers. On the other hand, "cold bathing," the most health promoting and health sustaining of all bathing, is almost wholly condemned by the stress laid upon its *use* instead of abuse. "The robust can stand it, although occasionally it causes skin diseases among them" Our own observation is in accord with the best literature on the subject, that the most robust are those who are addicted to its habitual use, and that such persons are

exceptionally free from skin diseases and possess the greatest power of resistance against other diseases. But this, too, has its limitations. It is the bath for *well* people, and in water less than 60° temperature, to be used not over five minutes at a time and with activity the while, followed by thorough friction.

The comforts of the bath-room are described with considerable particularity, but (page 355) with endorsement of the most abominable condition common to it—the water-closet. How it is possible for any one who indulges in the luxury of a morning bath, particularly the cold bath, and the deep, invigorating respiration which it incites, without acquiring repugnance to all sources of impurity in the air of the bath-room, is beyond our comprehension. And a whole chapter should have been added on out-door nuisances, particularly comprehending stable manure, which holds about the same relation to dense communities as water-closets in bath-rooms hold to families.

The chapter on "House Drainage and Plumbing" comprises a good description of the most recent improvements in apparatus worthy the attention of all housekeepers who would be protected against foul emanations from the drain pipes.

Under "Foods," more should have been said about bacon than merely "bacon should always be well cooked." Surely so, as of pork; but in digestibility and wholesomeness, well-cured bacon stands in about the same relation to pork as mature fruit does to green. Bacon (not pork) is the "hog" which, with hominy—meaning Indian corn and various preparations thereof—is so justly extolled for its nutritious and wholesome properties in the Southern States. Sweet potatoes, as "adapted to American conditions," in the Southern States particularly, where they are a good deal more depended upon than Irish potatoes, and to which, on account of the saccharine matter they contain, they are greatly superior in nutritive value, are not mentioned. It may here be remarked of them, to encourage their use, that, like some fruits—pears, for example—they are improved both in flavor and nutritive value by keeping. After a month or two the starch they contain becomes measurably converted into glucose, insomuch that on baking it frequently exudes as syrup. And the soft, syrupy, delicious flavor and increased nutritive

value of sweet potatoes thus acquired are conditions sometimes referred to by persons who have never given attention to the subject as "soggy," "been kept too long." Such persons do not even know how to cook sweet potatoes: they should be baked or roasted.

But we do not mean to condemn this book on account of the omissions and inadvertencies that have been cited and a few more of the same kind. It is good for the most part, only it does not go far enough. The "American conditions" to which hygiene is adaptable are immense. This work is a good introduction to them, and we take pleasure in recommending it to medical students and all lay readers who would acquire knowledge necessary to protect their own and their neighbors' health.

A Manual for Boards of Health and Health Officers. By Lewis Balch, M.D., Ph.D., Secretary State Board of Health of New York; Health Officer of Albany; Emeritus Professor of Anatomy and Professor of Medical Jurisprudence, Albany Medical College. Pp. 242. Price, $1.50 *net*. Albany: Banks & Brothers.

This book defines the powers of the State and local boards of health; contains such directions to local health officers as are commonly issued in special circulars; gives examples of problems which may arise and their solution, with suggestions for the prevention of disease and directions to be followed in times of danger from epidemics of contagious diseases. It comprises the official forms of death certificates, burial permits, birth reports, nuisance complaints, etc., with which all local health officers are supposed to be abundantly supplied, and the health laws of the State. It is, in short, a manual of such practical utility to local health officers throughout the State that they cannot afford to do without it.

Analysis of Milk and Milk Products. By Henry Leffmann, M.D., Ph.D., Professor of Chemistry in the Woman's Medical College of Pennsylvania, in the Pennsylvania College of Dental Surgery, and in the Wagner Free Institute of Science; Pathological Chemist to the Jefferson Medical College Hospital; and William Beam, M.A., M.D.,

formerly Chief Chemist B. & O. R. P. Pp. 90. Price, $1. Philadelphia: P. Blakiston, Son & Co.

This is a manual of practical utility, alike suitable for professional chemists, milk inspectors, and dairymen. It comprises a lucid description of the nature and composition of the pure milk of cows and other animals; Properties and Decompositions of Whole Milk, Skimmed Milk, and Butter Milk; Analytical Processes and Milk Adulterants; Data for Milk Inspection; Variations in Composition and Sanitary Relations; Milk Products—Condensed Milk, Butter and Cheese; and Tables for Correcting Specific Gravity and Calculating Total Solids. It is appropriately illustrated with cuts of analytical instruments, and is altogether such a manual as every milk inspector and dairyman should possess.

THE ANNUAL OF THE UNIVERSAL MEDICAL SCIENCES. A yearly report of the progress of the general medical sciences throughout the world. Edited by CHARLES E. SAJOUS, M.D., and seventy associate editors, assisted by over two hundred corresponding editors, collaborators, and correspondents. Illustrated with chromo-lithographic engravings and maps. Five volumes of about 500 pages each, 1893. Price, including the *Universal Medical Journal*, the five royal octavo volumes bound in cloth, United States, $15; Canada, $16.50; Great Britain, £3 5*s*. In half Russia, respectively, $20, $22, and £4 6*s*. The F. A. Davis Company, Publishers, Philadelphia, New York, Chicago, and London. Australian Agency, Melbourne, Victoria.

Prefatorily the editor calls attention to the advantage of his "prolonged sojourn in Europe," contemplated at the time of the preceding issue, and the benefit of it—the enlistment of twelve such eminent co-laborers in his work as Dujardin-Beaumetz, Benjamin Ward Richardson, Lépine, Obersteiner, Bourneville, Kerr, Lutaud, Budin, Buxton, Levison, Apostoli, and Poirier, each at the head of a department representing his own particular sphere. It would be difficult to adduce stronger evidence than the enlistment of such adjuncts to the value of this work, in the present issue of which is comprised the results of their analyses in addition to the sustained excellence of the work besides. But the work is no

less American on account of the excellence of this acquisition of representative medical science abroad. Quite the contrary, indeed; for no one can scan its pages and references without being impressed with the evidence of at least parallel progress, if not leadership, in America, as compared with other countries, in the most substantial gains of the year. The arrangement of departments, material references, indices, etc., are the same as for the preceding year, affording great facility in research for particular subjects and ready reference for authenticity. To medical practitioners of every degree, general and special, who would have the gist of medical literature for the year, and who would be abreast with medical progress, we commend the "Annual" as *the* source of information *par excellence*.

STERILITY IN THE WOMAN AND ITS TREATMENT. By DR. DE SINETY. Translated by E. P. HURD, M.D. Price, 25 cents. Detroit, Mich.: George S. Davis.

This is one of the monthly issues of the deservedly popular Physician's Leisure Library series, by a well-known European authority on obstetrics and the diseases of women. It opens with a brief chapter on fecundation. This is followed by a terse description of the causes of sterility, their locality, pathological conditions, organic and functional, their treatment, and artificial fecundation.

REACTIONS—A Selection of Organic Chemical Preparations. Important to Pharmacy in Regard to their Behavior in Commonly used Reagents. By F. A. FLÜCKIGER, Ph.D., M.D. Translated, revised, and enlarged by J. B. NAGELVOORT, Analytical Chemist to the Pharmaceutical Chemical Laboratory of Park, Davis & Co. 8vo, pp. 164. Detroit, Mich.: George S. Davis.

This is evidently a book of much practical utility to pharmacists, and by no means valueless to physicians; for, besides the experimental detail of chemical manipulation important to pharmacists, it comprises the properties of all the important alkaloids. It is printed on excellent paper, with abundant room for marginal notes, as a means of contributing to the value and usefulness of the work.

Essentials of Minor Surgery, Bandaging, and Venereal Diseases. Arranged in the form of Questions and Answers (Saunders' Question Compends), prepared especially for Students of Medicine. By Edward Martin, A.M., M.D., Clinical Professor of Genito-Urinary Diseases; Instructor in Operative Surgery, University of Pennsylvania; Surgeon to the Howard Hospital; Assistant Surgeon to the University Hospital, etc. Second edition, revised and enlarged. 12mo, pp. 166, 78 illustrations. Price, $1. Philadelphia: W. B. Saunders.

We had occasion to commend the first edition of this work two years ago, upon which the present is an improvement by additional illustrations. As a reminder-review work for students preparing for examination, or ready-reference manual for the hurried practitioner, it is admirably well calculated to fulfil its purpose.

Transactions of the Sanitary Institute, Vol. XIII. (being Vol. IV. of the Transactions published since the incorporation of the Institute), 1892. Pp. 500. London: Offices of the Sanitary Institute, Margaret Street; W. Edward Stanford, 26 and 27 Cockspur Street, Charing Cross, S. W.

This volume is principally a record of the Congress held at Portsmouth, comprising most of the papers entire and liberal abstracts of the rest, read at the five conferences organized in connection with the Congress. It also contains the papers read at the Sessional Meetings, with the discussions that followed, and the address of Sir Douglas Galton, at Worcester, to inaugurate the course of lectures to sanitary officers organized by the Institute; and a full record of the two years' work, with particulars of the examinations, list of donations to the library, and other matters of interest.

Transactions of the National Association of Railway Surgeons for 1892, edited by R. Harvey Reed, M.D., Secretary, Mansfield, O., is a closely printed volume of 233 pages. It opens with a brief chapter giving the minutes of the meeting. This is at once followed by papers on practical subjects—Surgeon C. B. Stevens, of Fort Wayne, Ind., and Surgeon W. H. Elliott, of Savannah, Ga., on "Or-

ganization of the Service ;" and next a paper by G. P. Conn, M.D., of Concord, N. H., on "Costs and Compensations," a title which but poorly indicates the subject, unless it be figuratively construed to mean the costs of accidents and unhealthful surroundings and the compensations of precautions and good health, for these are the subjects with which it deals. The unsanitary conditions of cars, depots, and the surroundings, and defective machinery are cogently described as disease-producing and death-dealing appurtenances to both employés and patrons.

"The Care of the Injured by the Pennsylvania Railroad," by Surgeon I. P. Klingensmith, of Blairsville, Pa., gives the other side of the question—without account of any shortcomings—and therefore complimentary to that company. The facts adduced are a mere programme on paper. Discussions follow, and it is gratifying to observe that the members of the Association, as a whole, are imbued with the progressive spirit of preventive measures.

Next follow papers classified : "Cranial Injuries," "Spinal Injuries," "Neurotic Disorders," "Medico-Legal Questions," "Injuries of the Eyes and Defects of Vision," "Fractures and Dislocations," "Amputations," "Anæsthetics," "Antiseptics," "Supplies for the Service," and "Miscellaneous Subjects." An eminently useful volume to all surgeons and creditable to the Association.

SHORTHAND INSTRUCTION AND PRACTICE is the title of a 230 page pamphlet issued by the United States Bureau of Education, edited by JULIUS ENSIGN ROCKWELL. It gives a history of shorthand writing, used in Greece as early as 195 A.D. The editor says that "in Rome Marcus Tullius Tiro, the freedman and friend of Cicero, undoubtedly used a method of stenography as early as 60 B.C., and the art is said to have been taught in schools. The Emperor Titus is mentioned as an expert notarius. The use of 'Notae Tironianae' seems to have been revived in the ninth and tenth centuries, and owing to the general use of wax tablets among the Romans, our knowledge of the method of Tiro has been principally gained from a study of these later writings. The first English treatise on shorthand was 'Characterie—An Arte of shorte, swifte and secrete writing by Character Inuented by Timothe Bright,

Doctor of Phisike, Imprinted at London by I. Windet, the Assigne of Tim. Bright, 1588. Cum priuilegio Regiae Maiestatis. Forbidding all others to print the same.' Doctor Bright's shorthand method was dedicated 'To the Most high and mightie Prince Elizabeth, by the Grace of God, of England, Fraunce and Ireland, Queen, Defender of the Faith,' etc." Then follows a historical sketch of the progress of shorthand down to Pitman, Graham, and Munson. Next comes a chronological list of authors and anonymous works in the English language, beginning with Timothe Bright in 1588 and ending with T. C. Strickland in 1891, followed by a statement of the progress of systems in various countries and in various languages. The tables presented show that from July 1st, 1889, to June 30th, 1890, 57,375 persons received instruction in shorthand. Of this number 23,325 males and 26,005 females (the sex of 817 being unreported) were taught in schools and classes and 7228 by mail. There is a chapter on "Stenographers in Court," one on "Shorthand Societies," and twelve pages of tabulated illustrations of the different systems by alphabet, from that of J. Willis in 1602 to that of Duployé-Pernin, in 1882.

THE SCIENCE OF THOUGHT. Three Introductory Lectures. By F. MAX MÜLLER. Pp. 128. Price, 25 cents. Chicago: The Open Court Publishing Company.

These lectures appear to be explanatory of the author's greater work on the same subject, which has been charged with being revolutionary. He holds, on the contrary, that his work is *evolutionary*, the natural outcome of that philosophical and historical study of language which began with Leibnitz, and which during our century has so widely spread and ramified as to overshadow nearly all sciences, not excepting what he calls the science of thought. He claims that thought and language are inseparable, and that this inseparableness binds our modern schools of thought with those of the Middle Ages and ancient Greece, which alone enables us to reconcile systems of philosophy hitherto supposed to be entirely antagonistic. An appendix of twenty-eight pages comprises correspondence between Mr. F. Galton, Mr. George Romanes, the Duke of Argyll, and others, and Professor Max Müller on "Thought without Words," from *Nature*.

NOTES AND NOTICES.

OLD PORTSMOUTH, NEW HAMPSHIRE.—The settlement flourished and increased in spite of all, and as soon as it had leisure to draw breath, it bethought itself of the school-house and the jail—two incontestable signs of budding civilization.

Down to 1696 the education of the young appears to have been a rather desultory and tentative matter; "the young idea" seems to have been allowed to "shoot" at whatever it wanted to; but in that year it was voted "that care be taken than an abell scollmaster [skullmaster!] be provided for the towen as the law directs, *not visious in conversation.*" That was perhaps demanding too much; for it was not until "May ye 7" of the following year that the selectmen were fortunate enough to put their finger on this *rara avis* in the person of Mr. Tho. Phippes, who agreed "to be scollmaster for the towen this yr insewing for teaching the inhabitants children in such manner as other schollmasters yously doe throughout the countrie: for his soe doinge we the sellectt men in behalfe of ower towen doe ingage to pay him by way of rate twenty pounds and yt he shall and may reserve from every father or master that sends theyer children to school this yeare after ye rate of 16*s.* for readers, writers and cypherers 20*s.*, Lattiners 24*s.*"

In 1704 the town empowered the selectmen "to call and settell a gramer scoll according to ye best of yower judgment and for ye advantag of ye youth of ower town to learn them to read from ye primer, to wright and sypher and to learne ym the tongues and good-manners." On this occasion it was Mr. William Allen, of Salisbury, who engaged "dilligently to attend ye school for ye present yeare, and tech all children yt can read in thaire psallters and upward." From such humble beginnings were evolved some of the best public high schools at present in New England.—*Harper's Weekly.*

NEW POSSIBILITIES OF FARM LIFE.—Wherever irrigation prevails, population is dense. We may confidently predict a larger population to the square mile in the reclaimed areas of most of the Western States than exist to-day in Massachu-

setts. In the nature of the case this must be true. Most of the valleys are comparatively narrow and the cultivable land is sharply limited by mountain ranges. Furthermore, land under the ditch is valuable and must be put to the most profitable uses. The larger the capacity of an acre to produce the smaller the average farm unit will be. Under these circumstances, man's ingenuity and energy will be constantly directed to evolving conditions of rural life that, while surrendering none of its peculiar blessings, shall approach most nearly to the realization of the best features of town life. A daring writer has predicted that electricity, next to irrigation, will be the largest factor in revolutionizing the life of the farm. He reasons that with the dense population and high average prosperity possible on irrigated lands, and the abundant and accessible water power usually existing in connection with canals, electricity will be used to light and warm the farmers' home, to propel his agricultural implements and move his crops over smooth roads to the market or railroad station. Certainly the possibilities for the improvement of social conditions in such communities are infinite. One of the advantages already realized is the general cultivation of trees, hedges, and flowers in the streets and yards. Nowhere else are such conditions enjoyed as may already be seen in the more advanced communities of arid America.—*From W. E. Smythe's article on "The Irrigation Idea," in October Review of Reviews.*

"From the Black Sea to the Persian Gulf by Caravan" is the subject of a series of three articles which Edwin Lord Weeks has written for *Harper's Magazine*. The first appears in the October number, under the title "From Trebizond to Tabreez," through the country of the Kurds. At Tabreez Mr. Weeks fell ill of cholerine, and his companion, the late Theodore Child, was nursed through an attack of cholera. Mr. Child's fatal illness from typhoid-fever occurred near Ispahan, which formed the terminus of the second stage of the journey. Mr. Weeks will describe that part of the route in the November *Harper's*.

"Street-Paving in America" is a suggestive article by William Fortune of Indianapolis, in the *Century* for October,

discussing some current problems of city administration, and recording important experiments in street-paving. The illustrations are by Castaigne, Harry Fenn, and other artists.

All calculations of the economies and profits of paved streets fail to encompass the sum of gain from them, because there is much involved that is intangible in character. The benefits of better sanitary conditions, with the consequent productiveness resulting from good health, the saving of expenses for medicines, and the professional services of physicians; the prolonging in some cases of lives that might succumb to the deleterious influences inherent in bad streets—all are incalculable; nor can be estimated the far-reaching effects of the retarded development of a city, due to failure to provide good streets.

LITTELL'S LIVING AGE is appropriately named. It is a true representation of "the living age"—the vast complexity of thoughts, interests, aims, speculations, imaginations, knowledges, retrospections, of the contemporary world.

A new volume, the 199th of this brilliant weekly, begins with the issue of October 7th, No. 2570, affording a very favorable opportunity to subscribe. The subscription price, $8, for the amount of reading furnished, is low, while for $10.50 the publishers offer to send any one of the American $4 monthlies or weeklies with *The Living Age* for a year, both prepaid. Send 15 cents for a specimen copy and club rates with other magazines. Littell & Co., Boston.

A MEDICAL DIRECTORY OF THE STATE OF CONNECTICUT has just been issued by the Danbury Medical Printing Co., of Danbury, Conn. It contains a list of all the medical practitioners of the State, the various medical societies, all the dentists and dental societies, druggists and pharmaceutical societies, nurses and training schools for nurses, hospitals, etc. Price, $1, delivered free by post.

THE INDEX TO HARPER'S MAGAZINE, including the contents of Vol. I. to LXXXV. inclusive, which literary convenience has been in long and careful preparation by the publishers, is now in readiness.

THE CONSERVATION OF OUR OYSTER SUPPLY is the subject that will open the November *Popular Science Monthly*. The writer of the article, Mr. Robert F. Walsh, shows that an oyster famine is threatening us, and describes, with many illustrations, the modes of restocking depleted beds that are coming into use in some places.

IN PRESS: SEWAGE DISPOSAL IN THE UNITED STATES, by GEORGE W. RAFTER, M. Am. Soc. C. E., and M. N. BAKER, Ph.B., Associate Editor *Engineering News*. One large octavo volume of about 600 pages, with numerous illustrations and plates. D. Van Nostrand Co., Importers and Publishers of Scientific, Military, and Naval Books, 23 Murray and 27 Warren streets, New York.

PUBLICATIONS RECEIVED.

Albinism, Pernicious Influence of upon the Eye, 10 pages. George M. Gould, A.M., M.D., Philadelphia.

Amputation, the Indications for in Chronic Diseases of the Larger Bones and Joints, 11 pages. J. E. Summers, Jr., M.D., Omaha, Neb.

Appendicitis, 16 pages. R. T. Morris, A.M., M.D., New York.

Astigmatism, leaflet. George M. Gould, A.M., M.D., Philadelphia.

Cancer, Caustics in the Treatment of, 6 pages. Daniel Lewis, M.D., New York.

Cholecystotomy, 8 pages. Edwin Ricketts, M.D., Cincinnati, O.

Cholera, Treatment of by Hypodermoclysis and Enteroclysis, 8 pages. Judson Daland, M.D., Philadelphia.

Dehoming, 18 pages. I. P. Roberts. Bulletin 54, Agricultural Division, Cornell University, Ithaca, N. Y.

Duty of the State to the Insane, 13 pages. Dr. Andrew Macfarlane, D. Appleton & Co., New York.

Eczema, Infantile, 7 pages. J. Merrill Ricketts, M.D., Cincinnati, O.

Elastic Constriction as a Hæmostatic Measure, 8 pages. N. Senn, M.D., Ph.D., Chicago, Ill.

THE SANITARIAN.

DECEMBER, 1893.

NUMBER 289.

PROGRESS OF PRACTICAL SANITATION.

ANNIVERSARY ADDRESS AT THE TWENTY-FIRST ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, CHICAGO, ILL., SEPTEMBER 10TH, 1893.

By SAMUEL H. DURGIN, M.D., of Boston, Mass., President.

As co-workers in the field of sanitary science, and its practical application to the prevention of disease and death, we have again assembled from different parts of this and other countries to join hands, and to take counsel with each other.

We have met this time under most unusual circumstances, and with surroundings and conditions of world-wide interest.

The Columbian Exposition marks an era in the world's history. Around us are gathered the evidences of advance in all lines of industry, of talent, and of thought. There has been a Peace Congress, a Congress of Religion, a Congress of Charities and Correction, and innumerable other gatherings for the purpose of comparing notes and showing the great advance in our civilization in all lines of thought and endeavor.

Among those who have died since the last meeting is Dr. Edward H. Janes, who for twenty-seven years occupied the position of Assistant Sanitary Superintendent of New York. He was also Secretary of the American Public Health Association for two years.

His contributions to the first three volumes of the Transactions were characterized by care and painstaking, and of a decidedly practical character.

He was much interested in his chosen work, and was a modest, upright, conscientious man.

Other workers have also passed away, and tributes to their memories will be paid by the Committee on Necrology.

The great trust which this Association took upon itself twenty-one years ago has been worthily held, and the work to which it has addressed itself, in the interest of humanity, has been diligently pursued. It is fitting, perhaps, at this time, when we may be said to have attained our majority in years, to take a retrospective glance of public sanitation, and to note the possible results of its application in the relief of human distress. The work of the sanitarian is manifold, and deals with the most vital of our personal and social interests. It deals with the air we breathe, the food we eat, the water we drink, the soil we live upon, and with the general welfare of mankind. It means the investigation of the rise, progress, and decline of epidemics, and a fostering growth of works and projects designed to prevent and remove the causes of disease.

AIMS OF SANITARY SCIENCE.

The sanitarian concerns himself but little with the cure of disease. The problem which he seeks to solve is how disease can be averted. The pathologist establishes the nature of morbid processes, and his investigations suggest to us the appropriate remedy. The aim of the sanitarian is to seek out and remove the cause or causes which produced these processes. It has been said that preventive medicine embraces everything which relates to the physical well-being of our fellow-men, so that it has to deal with all physical evils and, incidentally, many of a moral character. Its object is the health, and therefore the happiness and prosperity of man.

It is sometimes objected that public hygiene cannot lay claim to the possession of the qualities of an exact science, that its data are too partial, its generalizations too sweeping. Unfortunately some reason for this feeling exists on account of the enthusiasm of certain writers who exaggerate what is seen, guess at what is unseen, and shape their conclusions accordingly.

True sanitary science, however, is built up slowly by patient observation of facts. Sanitary science is not altogether of modern growth. It may be said to have experienced several revivals, but its real history is almost as ancient as history itself.

HYGIENE AMONG THE ANCIENTS.

The ancients fought against evil smells as vigorously as the moderns. A process of disinfection was adopted by Ulysses, and described by Homer; Hercules, too, was a practical sanitarian; but of all the ancient sanitary reformers, Moses was the most thorough and practical. He gave us the principle of the modern earth closet, although the animals of the field may be said to have anticipated him in that device. During the best times of Greece and Rome public sanitation was much studied, and the supervision of hygienic arrangements was an office of dignity among the Greeks and the Romans. The cleansing and disinfection of streets and sewers were placed under a high officer of state, because, as Justinian tells us, "uncleansed and unrepaired sewers threaten a pestilential atmosphere, and are dangerous."

Sanitary science owes something to the fathers of medicine also. Hippocrates was the first sanitarian who wrote an entire book on public health, and his discourses upon pure air, pure water, and pure soil are instructive reading at the present day.

It is exceedingly interesting and suggestive to find these ancient writers elucidating principles which the exact investigations of our time have demonstrated to be the true foundation of sanitary science.

In Mexico it has been shown that sanitary science must have reached a high degree of perfection in its history. Previous to the conquest of the country by the Spaniards, the towns were thoroughly and efficiently supplied with water by the most perfect system; but the teachings of those early times were not permanently effective. The magnificent civil works were doomed to suffer ruin, and the world passed through dark ages of mental and physical barbarism.

The devastating epidemics of the Middle Ages which cut off one quarter of the population of Europe are well known. Filth, instead of being abhorred, was almost sanctified. The monks imitated the filthy habits of the hermits and saints of early Christian times, and the early fathers commended them. Even St. Jerome used to praise the filthy habits of hermits, and especially commended an Egyptian hermit who combed his hair on Easter Sunday only, and never washed his clothes at

all. Monks up to the time of the Reformation thought, or professed to think that, by antithesis, pollution of the body indicated cleanliness of the soul. Practically, indeed, it might be said to have helped to it, because the odor of sanctity which infected these monks and hermits helped them to keep apart from the temptations of the world ; for the world scarcely cared to come into too close contact with these odoriferous saints.

MODERN SANITATION.

The science of public sanitation as practised in our day is a growth of recent years ; a reaction from the ignorance and negligence of previous generations in the matter of sanitary administration. This reaction may be said to have dated from 1838, when the English Poor Law Commissioners instituted an inquiry into the health of towns with a view to remove by public authority some of the evils incident to poverty for which the poor are not responsible, and which they cannot themselves remedy. The active movers in this work were Dr. Southard Smith, Mr. Edwin Chadwick, Dr. Arnott, and Dr. Farr, and it is to their labors and testimony that much of the present enthusiasm concerning sanitary investigation and administration is due. The work begun by these pioneers has been carried on with increasing zeal from that time forward. It has enlisted the active interest of a multitude of intelligent, earnest men, who have patiently and persistently devoted their energies to the investigation of the causes of disease, and a constantly increasing interest is being manifested among the people concerning all matters looking toward a more perfect conservation of the public health.

Employers have found that there is a financial aspect to the sanitary questions of the day, and that more work and better work can be obtained from men in health than from men diseased.

Legislation has been influenced by the researches into the causes of disease, and has followed the lead of the investigators.

The schools of Europe and America have one by one added to their requirements for a degree in medicine, a knowledge of sanitary science. It is becoming more and more apparent

that the first and largest interest of the State lies in this great agency of human power, the health of the people.

What practical results have followed from all this? What has sanitary science done for man as an individual and for mankind collectively?

In the first place, it can be shown that man to-day has a greater expectation of life than any of his progenitors. He may more reasonably look forward to a long life, and to a life less exposed to devastating sickness. His vitality has been expanded, his strength increased, and his days on earth prolonged.

From this brief review of the general subject of sanitary science let us turn to a more specific and practical consideration of some of its principles, and I will ask your attention for a few moments to the topic of *municipal sanitation.*

The municipal health officer, on entering upon his duties, finds himself confronted with innumerable questions as to the sources of danger to the public health, of which he has been selected as guardian.

He first pictures to himself an ideal sanitary condition—for example, a clean, dry surface; a well-drained soil; good public and private sewerage, the immediate destruction or removal of all decomposable wastes; wholesome food and water supplies, with a sufficient equipment to preserve all of these favorable conditions, and then his work of construction and maintenance begins.

It would be impossible within the scope reasonably given to a single address to more than touch lightly upon the large number of topics and the variety of each which falls under the care of the municipal health officer. I shall, therefore, delay you by a consideration of only a few of the more important subjects which affect the health of cities.

WATER SUPPLY AND DRAINAGE.

The difficulty of finding a pure and uncontaminated water supply in sufficient quantity to meet the ever-increasing requirements of modern civilized life, has confronted every large city on the globe. With the increase of population it is not possible to find a watershed which is not more or less polluted by the wastes of human life. Our great lakes even at certain

points upon their shores have become at times sources of disease. And some of the cities of the old world recognizing the difficulty of procuring waters which are not contaminated by sewage, have almost by force of necessity adopted a suspicious supply, and have trusted to methods of filtration for the removal of the disease-producing elements. London and Berlin afford examples of the immunity from infectious diseases attending the use of waters so filtered. A variety of opinions is held among sanitary engineers as to the best method of sewage disposal. The opportunity for the ultimate disposal of sewage is not the same for all cities. One city has the opportunity to discharge its sewage into deep tide water under such conditions as to give rise to no evil results, while other cities are not so favorably situated. It would be a safe principle to follow, however, never to discharge sewage matter into any river, lake, or body of water which is likely to be used as a source of water supply.

Although I am not prepared to say that through the scientific experimentation now going on in the filtration of sewage-polluted waters, the time may not come when the waters of any river or lake may be used as a source of water supply, and the sewage resulting therefrom then be returned to the streams in a state of comparative purity which will render them available for domestic uses. However much we may disagree as to the ultimate disposal of sewage, there seems to be a general concensus of opinion that the water-carriage system must supersede all others in its cheapness and capacity for a rapid and safe translation of our sewage from its initial starting-point to a proper and safe outfall, where it may be disposed of without offence and danger to the inhabitants of the city.

It is generally conceded that when this material is confined within its proper channels and constantly undergoes rapid removal it is harmless, and does not deserve the opprobrious epithet which it incurs under opposite conditions—namely, when stagnating without or even within its channels.

Under these favorable conditions the problem of the ventilation of sewers becomes extremely simple by harmless open grate covers over the manholes in the streets. The public sewers thus supplied with the proper and continuous incline to secure the rapid and continuous flow, are ready to receive

the private drainage from dwellings and factories and other sources.

The question of private or house drainage is more complex, and should be constructed only under regulations prepared by competent sanitary engineers, by plumbers who have shown their competency for such work to a proper board of examiners, and have been licensed therefor. The material for this work should be strong, tightly jointed, securely trapped, and ventilated above the top of the house.

With a system of sewage thus supplied, the privy vault and cesspool, which have been most serious menaces to the health of cities, should cease to exist.

It is easy to see that with such suitable provisions for the complete and rapid removal of all sewage, the escape of noxious emanations from the sewers into the streets and dwellings would be impossible.

The conditions under which sewer gases are generated and penetrate into houses are from the stagnation of sewage, by its putrefaction when the consequent generation of poisonous vapors are favored, and the absence of sewer ventilation, by consequence of which these vapors are confined and pent up, until they acquire a sufficient degree of tension to force the barriers by which we vainly attempt to exclude them from our homes. By the rapid removal of sewage, on the other hand, its putrefaction in our midst is forestalled, the generation of noxious gases within our drains and sewers is reduced to a minimum or wholly prevented, the ventilation of sewers is rendered easy and harmless, and, finally, such air, gases and vapors as must be contained within the sewers, being no longer confined, find an easy escape into the open air.

In the city of Boston our private drainage, like that in most cities, is unsatisfactory, and the cause of an immense amount of inspection, complaint, and annoyance, and undoubtedly the cause of much ill-health. We have statute laws and city ordinances which specify the method, material and workmanship necessary for the construction of house drainage. Plans for construction and repairs are submitted to, and the work approved by, the inspector of buildings.

The Board of Health is called upon to find defects and to

order repairs, and such repairs each year number about forty-five hundred.

For the purpose of ascertaining to what extent defective conditions of plumbing exist, and to what extent traps are supplied, and water-closets substituted for privy vaults, we have taken a large number of blocks of dwellings, both new and old, each season for thirteen years, and made house-to-house inspection, with the following results :

Want of traps, first five years, averaged	50	per cent.
During thirteen years	32	" "
During the last year	22	" "
Defective conditions of plumbing, first five years, averaged	49	" "
Whole thirteen years	39	" "
During the last year	34	" "
Use of privy vaults, first five years	28	" "
For thirteen years	14	" "
During the last year	3	" "

This means not only a very poor state of plumbing, but a want of commendable progress in the substitution of a better condition. It indicates poor construction and inefficient repairs.

It is my opinion that the regulations, supervision of construction and repairs of plumbing should be in charge of one department. The old privy vaults and cesspools, with their accumulation of filth, which were once so common, are now rapidly disappearing from the city. Nearly seven thousand of these privy vaults have been demolished in as many years, and the few remaining where a public sewer abuts the premises are under orders to go. The yard cesspools, which are also common nuisances, are being changed from receptacles for sink and other house drainage to those for surface drainage only.

The removal and disposal of refuse material has become a very serious question to the city as a corporation, and to the individual citizen. There are now in vogue several different methods for the disposal of the kitchen refuse, all of which are more or less objectionable. In one city it is carried away and dumped into the sea, in another it is collected and sold to

the farmers to be fed to swine, and in another it is removed to a distance from the city and buried or consumed by fire.

In the city of Boston, where the principal part is sold to farmers, and the remainder carried out to sea, the cost of collection and transportation has reached the annual sum of $170,000, or considerably more than the entire appropriation for the Health Department, which includes the maintenance of harbor quarantine, free public baths and urinals, hospitals for contagious diseases, disinfection, public vaccination, the care of public burial grounds, the inspection of nuisances, and other incidental expenses. This large cost cannot be diminished by any of the present methods in use, but must necessarily be increased by the growth of population, by hauling to a greater distance, or by the process of cremation, which is now in use in many of our cities.

It must be admitted that the storing of this material in our yards, and its subsequent transportation through our streets, creates a nuisance of a most disgusting character, and it seems to me it should not be looked upon by sanitarians as harmless, or as a satisfactory method of disposal, to say nothing of the enormous cost to the city.

It has for many years seemed to me that the kitchen wastes should, by some special provision in the kitchen stove, be disposed of as soon as they are formed. By this means all subsequent nuisance and expense would be avoided.

The other wastes of the city which are now dumped into the harbor and into other bodies of water, or upon vacant lots for filling, which are largely composed of combustible material, should undergo cremation, and their ashes used for filling.

The construction and care of our public and private streets have a sanitary side to be considered, especially when we remember the considerable proportion of the area of our cities which they occupy, and the frequent unsanitary condition in which we find them. While the construction of streets is almost purely a matter for the engineer, the health officer has frequent cause to complain of their filthy condition. Most streets in all cities present a more or less unclean and offensive surface. This condition may be due to a faulty pavement, want of pavement, or a lack of care, which is supported by a

popular notion that an unclean and muddy condition of the streets has no appreciable effect upon the public health. Macadamized streets where much used are unclean and offensive most of the time.

It would be in the interest of the public health, a cleaner atmosphere, greater public convenience and economy, if all of the much-used streets of our cities were paved with material which would present an even, durable, and non-absorbent surface.

The private alleyways are not only disowned, but generally uncared-for by the city. For the most part they are found to be unpaved, uncleaned, and a source of much complaint. Any attempt on the part of the health officer to cause these places to be cleansed by the abuttors is attended with great difficulty, delay, and frequent disappointment. It would be far better to place these private ways in charge of the city, and tax the people for properly paving and keeping them clean.

Under the head of *mortality statistics*, the health officer finds a valuable guide to important sanitary work, although it is to be regretted that much of the data found under this head is untrustworthy. These mortality tables, properly prepared, will show the extent of mortality, and to what extent it is excessive in any portion of the community, and its relationship to age and nationality. They will also show us the nature and causes of the diseases which occasion the excess of deaths and to what extent, and by what means these diseases are preventable.

This work begins with the physician, and ends with the registrar of vital statistics. Many physicians perform the duty of certifying the cause of death with great care and exactness, while others perform the same service with very little knowledge of the disease of which the person died, and with corresponding ignorance of the use and value of correct mortality statistics.

Unfortunately in many States there is no legal discrimination between the duties and privileges of the educated and the totally ignorant practitioner of medicine. The registrar who receives these certificates should be a well-educated physician, with considerable experience, so as to be able to reject fraudu-

lent and worthless certificates. Every one who has had experience in the registration of mortality reports understands how difficult it is to secure correct data from irresponsible persons. The cause of these shortcomings is partly insufficiency of diagnosis, due either to the difficulties inherent in obscure cases, or to imperfect medical training, and partly to a lack of conscientiousness in the performance of registration, whose objects and importance are not appreciated.

Obscure cases will occur in the practice of every physician, and due allowance must be made; and yet after reasonable allowances have been made, there still remains a degree of carelessness for which there is no excuse.

It is a common thing to find on death certificates, instead of the morbid process which caused death, such indefinite information as "disease of bowels," "disease of brain," "disease of skin," "stomach disease," "ascites," "convulsions," "dropsy," "fever," "debility," "teething," "inflammation," "infantile," "heart failure," and other unlikely causes too numerous to mention, and which ought never to be used upon the records as causes of death.

In my own city such certificates are rejected, and a competent physician sent to view the remains, and consult the family or friends of the deceased for information, with which to make a proper certificate.

It is to be noted, however, that information gathered in this way cannot be regarded as wholly trustworthy, and often results in the statement of "*unknown cause of death.*"

It would be in the interest of correct mortality statistics if the registrar could be authorized, in case of insufficient information, to cause such post-mortem examination by a competent physician as will enable him to record the true cause of death.

An examination of the mortality statistics will also betray the fact that we have an excess of deaths from contagious diseases and from diarrhœal diseases among children, and while these facts open up a wide field of labor for the municipal sanitary officer, we shall have time to mention but a few of the most troublesome of these diseases.

Small-pox, through the great discovery of Jenner, the ease of making an early diagnosis, and its perfect and easy control

by isolation and disinfection, is now one of the easiest and rarest comparatively of the contagious diseases with which we may deal.

Now and then our legislatures are obliged to listen to the petitions of a few anti-vaccinationists for the repeal of compulsory vaccination laws. I have too much faith, however, in the intelligence and sound judgment of our people to believe that these wholesome and necessary provisions will ever be effaced from our statute books.

We should not, however, in the absence of small-pox in our country, allow ourselves to grow indifferent to the necessity of keeping the susceptibility of our people to small-pox exhausted by means of early and successful vaccination of infants, and the subsequent and most important revaccination of adults.

The mention of cholera, like that of small-pox, strikes terror to the people of this country, and while the deaths from these diseases are infinitely small, the fear of them has served the municipal health officer in securing almost unlimited facilities for their prevention and control, which means may be largely converted to the care of other more common and destructive contagious diseases.

We have in diphtheria and scarlet-fever, diseases which are not only endemic in most of our cities and large towns, and of most difficult control, but diseases for which there is as yet no known prophylactic. It is easy to say, and it is equally true, that perfect isolation and disinfection in all cases would soon annihilate the two diseases, but here is where the great difficulty begins. We do not know where the infection is, in a very large percentage of cases, and therefore cannot make anything like a complete application of our disinfecting agents.

The diagnosis of diphtheria and of scarlet-fever is not always possible in their early but contagious conditions, even by our best physicians, but with the multitude of ignorant and indifferent so-called practitioners of medicine, who are called to attend such cases, and the many instances of mild attacks which do not attract attention, to say nothing of the semi-popular prejudice against the hospitals, we have the causes of the lack of information to the sanitary officer, the possession of which might lead to the control of the diseases.

These diseases are spread largely by children while in the early stages of the illness, or having mild and unsuspected attacks, and by those who are prematurely released from isolation through ignorance and fraud, and allowed in the streets and in our schools.

It would be out of place, as well as presumptuous on my part, to delay you at this time with the details of necessary public interference which would secure a mitigation of the prevalence of these two diseases. I will say, however, that I believe in early and continued hospital isolation, and that all cases should be supervised, and released from isolation only by medical officers appointed upon merit by the health authorities ; the same medical officers to be inspectors of schools, in which there is much valuable work to be done in detecting the early symptoms of contagious diseases, pointing out the many unobserved and growing defects in development and disabled senses of the children, reporting to the Board of Health the overcrowded and unsanitary condition of the school-room, inspiring an interest and pride on the part of all teachers to develop an aptitude in detecting early symptoms of disease, defective senses and deformities in children, and in developing a more popular interest in the needed reforms in school hygiene.

At a very small cost we might bring to bear the powerful influence and unoccupied energies of a large corps of talented young physicians, aided by over thirty-five thousand teachers, for the public and individual welfare of nearly thirteen million children in the public schools of the United States.

Consumption, the most destructive malady to the human race in our country, has received the necessary attention of the bacteriologist. He has demonstrated to us satisfactorily the cause of the disease, the methods of its transmission, and the means for its prevention.

I am sorry to say that as practical workers in public sanitation, we have sadly neglected to apply the means which we believe would prove effectual in largely abating the prevalence of tuberculosis.

The isolation of all persons suffering from consumption would be impracticable and perhaps unnecessary, but the use of small sputa-cups containing a disinfectant, at home, and

bits of absorbent napkin used and securely concealed in travelling, to be burned or otherwise disinfected on returning, should at least be urged by public health officers, and popularized as much as possible.

In this way we should try to counteract the indiscriminate and disgusting habit of careless spitting in all public and private places, where the sputa are soon dried, and in the form of dust start on the mission of deadly infection.

It is interesting in this connection to note the fact that from experiments conducted with the tubercle bacilli, the sputa from consumptive patients have been found to retain their infective power for several years, also the fact that at a recent international congress on tuberculosis one of the questions discussed was the necessity of obligatory cremation of the remains of consumptives.

Earth worms, it was urged, bring to the surface bacilli which infest the dead body, and in dry weather they may be inhaled in the form of dust. This, it is suggested, is the reason why the health resorts of the south of Europe are centres of tubercular contagion.

Drs. Lortet and Depugnes, of Lyons, related cases of such infection, and described experiments which they made which led them to demand obligatory cremation. They mixed the sputa of consumptives in earth which they placed in pots. A month later the earth worms in them were tubercular, and the earth they passed through communicated the disease to animals.

Other experiments were made by placing earth worms on the graves of those who had died of consumption, and it is said the results were confirmatory of the possibility of contagion being conveyed in this manner.

It should not be necessary to urge the sanitary claims of cremation for dead bodies before an assemblage of intelligent sanitarians. There are in this country already thirty-two cremation societies, fifteen crematories, and in the last five years there have been over two thousand incinerations.

Typhoid-fever, like cholera, has been studied most persistently and profitably in connection with our water and food supplies, and we shall have the pleasure of listening to a discussion of the causation of typhoid by infected milk at this Congress.

WATER FILTRATION AND CHOLERA.*

By Professor R. Koch, of Berlin.

It was due to the many and careful investigations which, during last year, were made at the water-works of Berlin and Altona, as to the processes of filtration, and as to the bacteriological character of the water before and after filtration, that one was persuaded that it was a sufficient guarantee for the proper performance of filtration if the filtration was performed at a pace of 100 mm. in the hour. It has now been shown by the further experiences of these water-works that by simply insisting upon this we do not arrive at any very satisfactory results. For, with the present arrangements, most water-works cannot comply with this rule, and, as a matter of fact, do not comply with it. Still we should persist even in future that a pace of filtration of 100 mm. (per hour) should be the first condition, but we must so make clearer and complete the rule that the end in view will be reached with certainty. This can be done by further rules of the following character: 1. The pace of filtration must not exceed 100 mm. in the hour. To make sure of this each separate filter must be provided with a contrivance by which the movement of water in the filter can be restricted to a certain pace and continually regulated so as to keep that pace. 2. Each separate filtering basin must, when in use, be bacteriologically investigated once each day. There should, therefore, be a contrivance enabling samples of water to be taken immediately after they have passed the filter. 3. Filtered water containing more than 100 germs capable of development in a cubic centimetre should not be allowed to reach the pure water reservoir. The filter should, therefore, so be constructed that insufficiently purified water can be removed without its mixing with the good filtered water.

To these rules I have still to add some observations.

In strictness the two last rules would suffice to remove the danger of infection from filtered water as far as it is possible

*Concluded from p. 413.

to do so in the case of filtration through sand. But I think it questionable whether it is necessary always to insist upon the rule of a daily bacteriological examination of each separate filter. If water-works, by their good construction and their proper and intelligent superintendence, give continuously good results, the strict insistence of bacteriological examination can be restricted to times of danger—*i.e.*, times when the consumption of water is greatest, periods of frost or danger of epidemics ; in the meanwhile, an examination every three days of the total filtered water would be sufficient. (Bacteriological examination as it now takes place—when it does take place—*i.e.*, a weekly examination of the total filtered water, is in all circumstances to be looked upon as insufficient.) In those periods when the bacteriological control is less strict, there should be close and strict regulation of the pace of filtration so as to have assurance that the process is properly carried out. Up to now we have only a few water-works in which we have contrivances to restrict the filter to a definite pace. As a rule, the pace is calculated by comparing the total amount of water filtered in twenty-four hours with the superficial area of the filter, but everybody who is aware of the usual procedure at water-works knows that in the course of four-and-twenty hours the demand made upon them is very different. At certain hours of the day a great deal of water is used ; on the other hand, at night, very little. Unless there is a reservoir sufficiently great to cope with all these fluctuations, the changes in the demand can only be met by changes in the pace of filtration. The statement that water-works are filtering at a pace of 100 mm. (per hour), if calculated in the manner explained above, has only a very doubtful value.

If the bacteriological regulation of water filtration is to be carried out on a large scale, it must be so carried out as to give the results in the shortest possible time. For this purpose, it is recommended to keep, as is the case in cholera investigations, the gelatine plates at a temperature of 22° in the breeding apparatus. Perhaps the time for obtaining a result can be still further shortened by the use of "Agar" plates at a temperature of 37°. As to this, I must refer to my previous writings as to an improved bacteriological diagnosis of cholera.

The supposition that filtered water containing more than 100 germs in a cubic centimetre is not sufficiently purified is quite proved by the experiences at the Altona Water-works, which have been confirmed by experiences at other works. By this it is, of course, not to be supposed that water containing 101 or 105 germs is to be condemned without further investigation. This depends upon an intelligent judgment of a particular case, and the figure 100 is only intended to give a basis obtained from experience to form a proper judgment.

It does not require any explanation that each filter should be provided with an arrangement by which insufficiently filtered water can be removed. I would, indeed, not have insisted upon this requirement if there were not several filter works which do not have such an arrangement. It is high time that everywhere care should be taken to remedy this very dangerous defect.

Rules as to the cleansing and recommencement of filtration, as to the degree up to which the sand layer may be allowed to wear away, as to the removal of the first water after the addition of new sand and after every cleansing, are not necessary if the process of filtration is regularly tested bacteriologically, and if the water which is, after the bacteriological examination, shown to be insufficiently filtered is removed. If this is done, the question need not be considered as to whether in our climate, in all circumstances, closed filters should take the place of open ones. It is the business of those in charge of the works to take care that the filtered water always satisfies bacteriological requirements. That construction and that use of the filters will always be the best which produces a water most free from germs. If, therefore, any contrivances are discovered which enable the open filters to filter well even in periods of frost, there is no reason why open filters should not be further used; if, however, such contrivances cannot be discovered the open filters should give way to covered ones. The managers of the several water-works will have to make, aided by bacteriological investigations, their own rules for themselves. They will especially have to discover the time requisite to enable the natural water to form a good filtering mud layer, how much water after cleansing must be kept from use on the ground that it contains too many germs, how far

one may allow the sand layer to be worn away, etc. It is also the duty of those in charge to discover the best means of meeting the demand if, as is often the case, too great a supply is wanted from the water-works, and regular filtration cannot therefore be carried out. In one case, the best means will be found to necessitate an enlargement of the works ; in another, it may be sufficient to remove waste of water by the introduction of water-metres. All this can, as I have said, be left to the managers of the water-works, if they understand that it is their duty always to supply water which is bacteriologically satisfactory. In those cases, however, in which the managers do not understand how to regulate the water-works bacteriologically, it will certainly be necessary, if mischief is to be avoided, most strictly to superintend the works as regards all these possible causes of disturbance. But who shall undertake this superintendence? Only the State can do it. It not only can but must undertake it ; it is its duty. What is not already examined and superintended? Chemists' shops, hospitals, steam-boilers, factories, with their arrangements for the protection of their employés, are under State control, in order to prevent that individuals should come to grief through want of skill or negligence. If a misfortune results from defects in water-works, it is not one affecting a few individuals, but the health and lives of thousands. Having been forced to this conclusion, we cannot possibly leave these matters to look after themselves, and wait till even further mischief is done than was done in Hamburg and Nietleben by the cholera or in Altona and Berlin by the typhus. It is high time that we should abandon a waiting attitude, and should resolve upon energetic action.

Our previous nearly blind trust in water filtration has been considerably weakened by the circumstances just described, and it will be the question in future, in erecting new water-works, whether it would not be better to choose other water in place of surface water. Formerly only spring water was considered to be a substitute for surface water, as the use of subsoil water was shown by several unfortunate experiments to be inadvisable, on account of the iron contained in it. But this difficulty is now much nearer solution, since it has been found possible to remove the iron in soil water in a simple

and inexpensive manner by exposure to air and filtration. In this way a far stronger competitor to surface water has arisen, and it appears that, thanks to these improved methods of eliminating the iron, the early prejudices against subsoil water are gradually disappearing. This is seen by the fact that the number of works for the supply of subsoil water have been much increased in recent times. The first works were those of Halle, Leipsic, Dresden, Charlottenburg. Later on these were followed by those at Norderney, Kiel, Bonn, Cologne, Elberfeld, Düsseldorf, Mannheim, Dortmund, Mülheim, Oberhausen, Barmen, Köthen, Krefeld, Linz, Pressburg, Budapest.

The subsoil water gives us absolute security with respect to the danger of infection, and it should, therefore, if it can only be obtained in sufficient quantity and if it is not objected to on account of chemical characteristics—*e.g.*, too great hardness or too great an admixture of chloride—be preferred under all circumstances to surface water.

I indeed hold it even to be desirable and in some cases even necessary that works already constructed to filter river water should be so changed as to be used for obtaining subsoil water. Why I think so I should like to explain by a definite example.

The Berlin Water-works at the Stralauer Gate are very unfavorably circumstanced. When they were constructed the Spree at the intake was exposed to relatively little contamination. In the course of time, however, the conditions have considerably changed. The town has developed itself very considerably beyond the water-works above the intake, so that the works are now within the town. A part of the fields which receive the sewage from the north of Berlin are drained into the Spree not far above the intake; the traffic of the Spree is much greater than it used to be; moreover, Kötenick, with its numerous laundries, is situated above the intake. If one takes all this into account the Spree water at the intake can hardly be considered better than the Elbe water below Hamburg. The arrangements of the water-works leave a good deal to be desired in other respects, and we should not forget that they are the oldest on the Continent. As to the difficulties which the works have to encounter in winter with their

open filters, these we have already discussed. Besides in the period of a year, and even of a single day, the demand upon the works varies in so unequal a degree that with its small reservoirs it is unable to make provision for the considerable fluctuations in the demand. It must, therefore, of necessity at times filter at a pace beyond that which we have given as our maximum. If the works were not under the excellent superintendence of the Engineer Piefke, a man of repute both as to scientific attainments and practical experience, the result would have been worse than the typhus epidemic of 1889. Those in charge of the water-works, acquainted with the dangers of the situation, have in good time provided water-works at the Müggelsee (a lake) with covered filters in substitution for the Stralauer Water-works. The works at the Müggelsee are to commence operation on July 1st of this year, and on the same day the Stralauer Works will cease to be used. However, there are doubts whether one can do without the Stralauer Works. Should these doubts be confirmed the case would occur that I am now thinking of. I do not believe that if there were now again danger of cholera any one would have the courage to undertake the responsibility for the further working of water-works situated so dangerously. There would then be no other resource but to take in place of the Spree water a less dangerous or, if possible, quite innocuous water, and in such a case there would be no other substitute but subsoil water. Fortunately the conditions necessary to enable the Stralauer Water-works to obtain subsoil water are as favorable as they are unfavorable for using river water. Previous experiments on the subsoil in the neighborhood of the water-works have shown that at a depth of about 15 metres there is a gravel bed of great extent and rich in water. A trial boring of 1.5 metres diameter, driven into this gravel layer, gave for a considerable period, without in any way diminishing in its copiousness, daily 3000 cubic metres of water. This water was found to contain iron, but it was from experiments with the water from this boring that the system which is now used to eliminate iron from subsoil water was discovered. It can, therefore, with certainty be stated that this water can be freed from iron. If the stream of subsoil water in this territory can be opened up by a sufficient number

of borings, it would easily supply as much water as can be dealt with by the Stralauer Water-works with their arrangements. In order that water may be freed from iron, it must first be exposed to the air and then be again filtered in order to remove from it the iron which has been separated. It would be, therefore, necessary to have some arrangement for aëration. It would not be necessary, on the other hand, to have any special arrangement for filtration, for the process of filtration in question is quite different from that which deprives the surface water of the micro-organisms contained in it. The flaky precipitate of hydratic oxide of iron which results when water cotaining iron is exposed to the air is easily kept back by thick sand or by gravel even at a very high pace of filtration. For this purpose the three covered filters of the works would be completely sufficient ; the open filters could be completely abandoned, and thus disturbances in the winter would in future be avoided. I think that I have therefore shown that with relatively small alterations these works, which now give a water of doubtful value, can be changed so as to give equal quantities of quite unexceptional water.

The conditions of many other water-works known to me are similar to those ascertained in this case, and they might be improved by the adoption of the same principles.

UNRELIABILITY OF SMALL FILTERS AND THE DANGER OF WELL-WATER.

In order to complete the discussion of the relations of water filtration to cholera, I must now, after this discussion of filtration as it is carried out in the great water-works, shortly consider filtration, as well artificial as natural, of water in small quantities.

For domestic filtration—*i.e.*, for the use of a family or of one house—there are small filters of a most varied construction at our disposal. Of these there are not many which can keep back micro-organisms, and therefore infectious matters, from the water, and those which can do so—*e.g.*, those made of silicious marl, aluminous clay, asbestos, and celluloid—remain only a few days impermeable to germs, and very soon fall off as regards the quantity of water they supply, and require a very careful handling. I am not aware of any small filters

which suffice for practical wants for any length of time, and I should not advise depending upon small filters in times of cholera.

Far better are the results of natural filtration. Rain-water, when it sinks into the ground and ultimately becomes subsoil water, passes through far thicker layers and with far less rapidity than river-water when passing by artificial filtration through sand filters. If the soil is only sufficiently granulated, we have in soil filtration a much more perfect process than is at our disposal in artificial filtration. As a rule the soil is of a material much more finely granulated than the comparatively coarse-grained sand of the filter, and it is fair to expect that the subsoil water, after passing sufficiently thick layers of this finely granulated soil, will be either very poor in micro-organisms or quite free from them. This is confirmed by the investigations of C. Fraenkel, who has shown that subsoil water, even in a soil which has been much and for a long period contaminated, as in the case in Berlin, is quite free from germs. In other places the same results have followed from investigations made on this point. We have, therefore, no reason to keep out of consumption the subsoil water, which can be found nearly everywhere. On the contrary, we cannot find a better filtered water and one more protected against infection. The only difficulty is to bring this perfectly purified water into consumption without its being later on again contaminated and infected. In this respect great errors are still most inexplicably made everywhere.

If the subsoil water is raised by means of an iron conduit pipe, the possibility of contamination is avoided. The soil is so close to the pipe that no real disturbance of the filtering layers of the soil are produced by the boring. All liquids, even those most strongly contaminated, must before reaching the depth from which the water is raised pass through thick and efficient filtering layers, by which they are rendered quite absolutely free from infectious matters. Especially is this the case if the boring goes through an upper impermeable layer into deeper sand or gravel layers containing the water. Water coming from such depths will certainly nearly always contain some iron, but this is, in the case of a single pump, as also in the case of large filters, no reason for rejecting the water. It

will only be necessary to free the water from iron according to the methods above described—*i.e.*, by exposure to air and filtration—in order to obtain quite excellent water in no way inferior to the best spring water. For this purpose the method given by Piefke is to be recommended, as it has proved itself to be excellent at Hamburg in the case of a number of pumps giving water containing iron.

The most rational way of obtaining subsoil water is undoubtedly by the use of iron pumps. There is, it is true, the objection against it that the pumps gradually bring up less and less water. But it has been observed that this has nearly always been due to the fact that the metal sieve which is intended to protect the pipe at the lower punctured end against sand has been stopped by mud and become incrustated. But it will be easy to find a means of avoiding this by giving such a construction to the lower end of the pipe as to enable the metal sieve when stopped up to be removed and to put a fresh one in its place.

Iron pumps are unfortunately still too little used. Almost everywhere the subsoil water is obtained in the old-fashioned but most irrational system of wells. The construction of the well is such that, from underneath—*i.e.*, from the subsoil water, if the bottom of the well is deep enough and is in a good filtering soil—only good filtered water can come into the well. But from above the well is nearly always exposed to very serious contamination. Very often the wells are quite open or insufficiently covered ; but even if they are covered above by masonry, or by iron plates, nearly always in the uppermost layers of the soil surrounding the well, which in summer become quite dry and in winter are exposed to frost, there are cracks and fissures which allow unfiltered water coming from these unfiltered layers to leak into the well. Even masonry or cement is, when subject to these influences, so cracked and fissured as to be unable to prevent the water flowing from the surface of the soil to reach the well. But this very water can be very badly contaminated, for the water of the well is used at the well for laundry purposes and for the cleansing of domestic utensils. Contaminated in this way, and possibly infected, it finds its way through the cracks and fissures of the covering back into the well. Besides the wells

are generally situated in the lowest part of a district. As a result they receive the filth of over-full dung-heaps, gutters, etc.; and often the rain washes toward the well filth from human dwellings even if situated at a considerable distance. The fact that epidemics having their source in well-water are generally observed to occur after a heavy rainfall is to be ascribed to the above fact. A proof that even cholera infection can have its source in a well contaminated in such a manner is to be found in the case of a well in the neighborhood of Altona, into which filth had been allowed to pass from the surface. As to this case, I shall have to report in another paper.

Wells, constructed no matter how, should not be tolerated in future if they are exposed to contaminations of this character, even if there is only suspicion that such contamination might take place.

It will certainly not be easy to arrange that wells already in existence, even if badly constructed and dangerously situated, should be given up ; but that is not always necessary. It will be comparatively easy in most cases so to alter the construction of the well as to remove all danger of contamination from above. It is only necessary to give to the well the same protection, or approximately the same protection, against contaminating percolations by means of filtering layers of soil such as exist in the case of a simple pump. To achieve this, one should proceed by filling the well up to the highest water point with gravel, and over the gravel with sand up to the very top. Here it is of course assumed that the well is already provided with an iron pipe, or, if this is not the case, that it will be provided with one before the gravel and sand are put in. In this way the well is turned into a pump, with the advantage over other ordinary pumps that its lower end dips into a layer which gives no resistance to the subsoil water. If it is proposed to keep the water supply of the well quantitatively intact in order that, for instance, for purposes of extinguishing fires, a certain quantity of water should be at hand, there should then be erected above the highest point reached by the well-water a construction of masonry or of iron capable of lifting the protecting sand-covering. But the last should never be less than two metres deep. It is also to be recommended that the pump should not be erected immediately

over the well, but some distance from it, and that it should be put into communication with the well by a lead pipe. This would prevent the water of the well, which when used for washing and other domestic purposes becomes foul, from leaking into the soil around.

Wells protected in this or similar methods, by good filtering layers, give the same protection against the infection of water as is given by the sand filtration of the great water-works. In fact they really give a greater protection, for they are not exposed to the many disturbances in the process of filtration referred to previously, and are also not affected by frost.

So much attention is now being given to perfecting as much as possible the water supply of the great water-works, that it is important not to lose sight of the domestic water supply by pumps and wells. By improving the wells in the manner explained above, the spread of cholera, in so far as it is due to water, can be restricted to a great extent. It is just in this respect that a great deal can yet be done.

THE THREE CLIMATES OF JAMAICA, B. W. I.

ITS COAST, OR TROPICAL, TEMPERATE, AND MOUNTAIN CLIMATES. JAMAICA REGARDED AS A WINTER ISLAND FOR HEALTH.*

By Wolfred Nelson, M.D., New York.

In this brief sketch of the three climates of Jamaica I follow the division laid down by the Spanish discoverers, not forgetting that although Jamaica is now English, it was formerly Spanish.

All who have lived or travelled in Spanish America or the West Indies will recall the old-time division of climates into, first, the *tierra caliente*, a coast or tropical climate; second, the *tierra templada*, or temperate climate; and, third, the *tierra fria*, or climate of the lofty mountains.

Several of us have lived and practised in the tropics, and I do not see where we moderns can improve on the old division. As in the case of all truths, improvement is impossible.

* Read in the Section on Hygiene, Climatology, and Demography of the Pan-American Medical Congress, Washington, D. C., September 7th, 1893.

M. Paul Biolley, in a recent work, refers to the three climates as three vertical zones. He calls the coast country "the hot lands," their mean annual temperature varying from 72° to 82° F.; the central, or second region, he styles "the temperate lands," since they have a mild, healthful climate, with a temperature varying from 57° to 68°; and his third zone he calls "the cold lands," including the lofty mountains, or all the land above 7500 feet elevation, where the difference between the temperature by day and by night is great, making a climate, of course, wholly unfitted for invalids.

So much may be said by way of introducing the Spanish *past* and the English *present and future* of the beautiful "Isle of Streams." We must assume that our patients are of the well-to-do classes of the coast and inland cities of America on or near the Atlantic seaboard—the people who are ordered off by city practitioners to avoid the long and trying winter of the north.

Medical men to-day are deemed little less than walking encyclopædias. Patients must be told to take summer and winter clothing; they must be informed which are the best steamer lines; and they must be furnished with a letter of introduction to some physician in the winter resort.

In speaking of Jamaica I am not dealing with the unknown. From Panama and from New York I have sent patients thither, and the excellent results in selected cases have been alike gratifying to me and satisfactory to the health-seekers.

A brief glimpse of the trip from New York City may be *apropos*. The Atlas Line lands passengers in about five and a half days at Kingston, the capital of Jamaica. Kingston has one of the finest harbors in the West Indies. There the patient is in the coast or tropical climate—the *tierra caliente* of the Spaniards, or the "hot lands" of M. Biolley. When he has gone ashore a hotel or pension will be in order. Both exist. The means of the patient will determine his selection.

Kingston—thanks to its far-seeing mayor, Dr. Ogilvie—is one of the best-kept and cleanest of West Indian cities. I speak after experience gained in extended travel in the islands of the various groups.

The weather and climate are the things next to be considered. The mornings are cool. It is hot at noon; but soon

after midday a delightful sea breeze sweeps in from the Atlantic, a life-giving breeze, Dame Nature's own champagne. The evenings are pleasant and the nights are cool enough for restful sleep. Kindly bear in mind that I am dealing with the period recommended to the health-seeker from November to April, or the months so trying in these latitudes to all in impaired health.

I assume, as a matter of course, that no seeker for health will visit any health resort, be it where it may, unless under medical advice. Many without skilled advice simply hasten the end, and rush off to die amid strangers.

What are our patients to do in Kingston? Mental recreation they must have while the climatic cure is in order. Kingston has an estimated population of sixty thousand people. There are four ably edited daily papers, furnished by cable with the news of the world. Public buildings, churches, and all that we moderns deem so essential to our artistic existence are to be found within the city. Lovers of Nature will find her delightful pages open and ready for interpretation at every turn in any of Jamaica's three climates. Those of a scientific turn of mind and lovers of books can both satisfy their respective longings; all can easily find the mental distraction requisite while mind and body are obtaining needed rest.

Those who are to make a stay in the city will naturally like a change occasionally. What shall it be?

Delightful and instructive trips may be made around the coasts of Jamaica by steamer—a journey of some five hundred miles—the voyager visiting more than twenty ports and enjoying a succession of tropical vistas. Carriage tours may be made on the coast levels. Jamaica is famous for her perfect roads. To those from the north all will be new and highly attractive. A stay at the Constant Springs Hotel, some eight hundred feet above sea level, will be a pleasant change. The hotel is situated on a fine plateau some six miles out of Kingston, beyond the village of Hay-Way Tree. It is a large building, especially made for winter visitors, and substantially built of stone. It has the all-around galleries that are so comfortable and pleasant, offering a magnificent view as well as restful shade. There one can sit and feast his eyes on the

varied tropical scenery made possible by the three climates of Jamaica. Below is the city of Kingston ; beyond it stands old-time Fort Augusta, a Spanish souvenir. Close at hand are the foothills ; above them, Newcastle, a mountain camp nearly three thousand feet above sea level ; and towering over all are the lofty Blue Mountains, whose peaks rise for seven thousand and eight thousand feet above the sea.

Many delightful outings may be devised for pastime, such as picnics to the hills or trips to the city or to the Government Gardens. In the cool of the morning exercise may be taken on foot. With horses and carriages there will be no lack of variety.

At the Constant Springs Hotel the guests are in a land of sunshine, with an average temperature of say 80°. Leaving there, let us go into Kingston and take the railway to the mountains, going there by carriage to the hotel at Monteague, built and opened in 1891 as a " hill resort"—a *locale*, in a climatic sense, midway between the coast and the mountain level at Mandeville (of which more anon). I found the hotel there good, suited to its purpose, with rooms well ventilated. The building has lower and upper balconies—delightful lounging places where the weary can rest body and mind and be content.

The drive from the hotel to the railway, when it is taken early in the morning, is a wonderful experience. In the early hours the peaks pierce the masses of fleecy clouds that hide the scenery below. Looking down from the upper levels of the " divide," a Canadian will fancy the cloud masses to be a huge snow-covered plain.

I have made two trips to Jamaica. Limitations of time prevented me from visiting Mandeville. For my information regarding it I am indebted to the Hon. George Solomon, to whom the Santa Cruz Mountains are a favorite theme. Mandeville is a mountain village some two thousand feet above the sea level and just within Jamaica's second or temperate climate. On a clear day the view from Mandeville is wonderfully fine. The distant ocean can be seen, a vast sheet of blue closed in by the horizon.

Mandeville is within easy reach of Kingston, part of the way by rail and the remaining six miles by carriage. There

are a number of boarding houses and a hotel. Arrangements for Mandeville should be made in advance.

Jamaica represents a wealth of tropical scenery. Its variety gives it a special charm. Many patients require so much distraction that a suitable climate alone is not sufficient for them. Many of the nervous class must think of other matters, and be forced into exercise and recreation. Exercise without fatigue should be the order. To the medical mind such exercise means much—tissue, change, rest, repair, new strength, increased appetite, sounder sleep, and a greater capacity for enjoyment. Such a course in neurasthenia generally means cure, or what Dr. Linn, in his book, terms the "climatic cure."

I have referred to two of the three climates of Jamaica. Those who are sufficiently well can investigate the third and "do" the lofty mountains. A day may come when sanitariums will be found in them; but for the purposes of our patients we must be content with two climates, leaving the third for convalescents and tourists.

M. Stern, M.R.C.S., England, L.R.C.P., London, in an excellent article on the climate of Jamaica,* refers to the seasons of the island as "two rainy and two dry seasons, one in May and one in October, lasting for about two months, the intervening periods being known as the dry season. From December to the end of April the weather is fine and dry." He adds, "In estimating the fitness of this or that climate, where it becomes a question of choice of residence for an invalid, barometric pressure and amount of moisture are also important factors in the calculation. The more equable the temperature, the lighter the air, the less the barometric pressure (always, of course, with certain limits), the clearer the sky, the more favorable are the climatic influences."

Dr. Stern quotes Dr. Lincoln, an American writer, thus: "It is now admitted that the most general test of the value of a climate consists in its suitability to be lived in, or, if this seems like tautology, the best climate is that in which a delicate person can be out of doors with comfort and safety for the greatest number of hours and days in the month. This

* "Handbook of Jamaica," 1881.

requirement can be fulfilled in most cases only by the combinations of clear sky (sunlight), warmth (not of the rays of the sun, but of the lower level of atmosphere), and equability or freedom from violent changes of temperature and chilling winds."

To quote further from Dr. Stern's extended experience as a practitioner in Jamaica: "Now, here, sunlight is abundant, equability is unquestioned, and in the higher lands there is the element of stimulus (which is perhaps somewhat wanting at the lower levels). Air stimulus is important in association with equability. The moisture, besides not being excessive, has this advantage, that it interposes a protective screen from the intense solar rays. Thus sunstroke, so common an occurrence in New York, is, even in the hottest and most sultry day of exceptionally severe seasons, almost unknown. Exposure to the midday sun is nevertheless always to be avoided, especially by new-comers."

Dr. Stern rightly classes the climate as a sedative one, and while noting that such a climate may not be the best for all pulmonary cases, he adds, "For the catarrhal variety [of consumption] so common in England and America, such a climate is eminently beneficent, and we believe it will be found that it is mostly this form which has so wonderfully improved here. The genial warmth, the free ventilation, the light, the freedom from clo e rooms, the little chances of getting chilled—all contribute to this end. . . . Perhaps we might venture to say that for all cases of incipient phthisis it is all that could be wished, arrest of the progressive symptoms being most marked."

Dr. Stern then passes on to review the springs of Jamaica, the curative waters of which are historic. "There are several mineral springs on the island," he says. "The two principal are, one in Vere, fifty miles from Kingston; the other in the pretty village of Bath, in St. Thomas. The waters of the first are useful in gout and rheumatism. In this respect they will rival most if not all of the famed thermal waters of the continent, or even Buxton, in Derbyshire, which we believe to be even more beneficial than Aix-les-Bains, in Savoy, Baden Baden, or Wiesbaden.

The results of analyses of the waters in Jamaica have been published recently in a book issued by the government of the

island. The title of the book is, "Jamaica at the Columbian Exposition." The article referred to describes the springs, the climate, etc., and is from the pen of Dr. Thomas L. Stedman, of New York City. It appears also in Buck's "Reference Handbook of the Medical Sciences." On page 84 of the book first mentioned, Dr. Stedman mentions the following springs: (1) Milk River Bath; (2) St. Thomas the Apostle; (3) Jamaica Spa; (4) Silver Hill Spring; (5) Manatee Bay Spring. The first of these is a thermal sulphur spring; the second, chalybeate; and the third, a thermal saline spring.

Dr. William Osler, in his book* describing a suitable climate, fully endorses the views held and advanced by Dr. Stern in 1881. Dr. Osler epitomizes the matter thus: "The requirements of a suitable climate are a pure atmosphere, an equable temperature, not subject to rapid variations, and a maximum amount of sunshine. Given these three factors, and it makes little difference where a patient goes so long as he lives an out-door life."

Dr. T. M. Coan, of New York, in his introduction to Dr. Linn's work, "The Health Resorts of Europe," summarizes the subject in happy phrase as follows: "The very pleasurableness of health resorts, in fact, conspires with the scientific methods of therapeutics. The happy mind and the healthy body are correlatives. Watering places combine in a measure heretofore unknown the strictly curative arts with the means and appliances which go to make up cheerful daily existence. Whether in the beauty of the mountain solitudes or the stir of a crowded and sociable resort, the philosophy of cure is the same—to combine the most approved methods of science with agreeable social and spiritual conditions. Under such conditions the tour and the cure are coincident."

In closing, I can only reiterate a statement of my own, made some months ago, "*Jamaica's greatest wealth is her perfect winter climate.* A visit will reveal her grand and classic scenery; and her climatic advantages as a winter island for health are of the highest order."

* "Practice of Medicine, New York, 1892." New York, August, 1893.

THE DISPOSAL OF THE GARBAGE AND WASTE OF THE WORLD'S COLUMBIAN EXPOSITION.

A PAPER READ AT THE INTERNATIONAL CONGRESS OF PUBLIC HEALTH,

CHICAGO, OCTOBER 11TH, 1893.

By W. F. MORSE, New York City.

TWO years since the report presented by the Committee of the American Public Health Association on the Disposal of Garbage and Refuse gave a clear idea of all the methods then in use for the disposal of city waste. Since that time the progress of destruction by fire has been by far greater than has been the employment of other devices. It is the purpose of this paper to briefly state what has been added to our knowledge on the subject, with special reference to the disposal by fire of the organic waste and garbage of the World's Columbian Exposition.

Total destruction by fire of city waste has been proved by six years' experience to be of great service to this country. So far as reports can be obtained, none of the garbage furnaces in use two years ago have been abandoned, but, on the contrary, the number has nearly doubled. New forms of destructors have been brought forward for experiment; novel ways of employing fuels are on trial; the utilization of the heat produced for obtaining power is found to be practicable; more convenient means for handling the material are used; the cost of operation is considerably reduced, and a general survey of the whole field shows a decided advantage both in number of furnaces constructed and their ability to perform the work required.

In Great Britain a still more rapid advance has been observed. From an exhaustive report to the City Council of Edinburgh made by a special committee, a paragraph may be quoted:

"There are now more than 310 cell destructors in use throughout the principal English towns, consuming 2000 tons of refuse per day, at a cost varying from two and a half pence per ton at Bolton, to three and a half pence at Southampton; nine pence at Ealing and Leicester, to one shilling at Derby, and one shilling three pence at Winchester."

It has been stated by competent authority that the present yea there would be built in England 100 more cell destructors dealing with 250,000 tons of refuse per year. Thus, in Great Britain the process of destruction or disposal of town waste by fire has become a necessary part of the municipal sanitary work. No other new methods or devices appear to have been brought into use. There is a notable absence of the mention of any form of utilization of waste until the purification by fire has been first made.

Here at home there has been manifested a deep interest in this question; many cities and towns have sent out commissions for inquiry and examinations at places where various furnaces and process methods are employed, resulting in reports and recommendations for the erection of garbage furnaces. The individual yearly official reports of health officers have in a great number of instances included a concise description of garbage cremators, with estimates of cost of construction and operation, urging upon the attention of the city authorities the adoption of this form of waste disposal.

Perhaps the most instructive example of the disposal of waste by fire has been the work done for the past five months at the World's Columbian Exposition, and which is daily going on, affording an opportunity for a personal inspection of the value and sanitary usefulness of this means of getting rid of the "sins of the people."

When the plans for the World's Columbian Exposition were completed and it was known that 600 acres of ground would be occupied, that a considerable part would be used as the permanent residence of persons who would be constantly on the grounds, and that for six months the buildings would be thronged by a vast multitude, it became evident that the sanitary care of this extent of ground and its inhabitants was one of the most serious questions before the administration.

Given a residential population of 30,000 to 40,000 and a

daily average of 150,000 to 300,000 additional visitors, it was estimated that the excreta, garbage, refuse and waste of every kind that must result from their presence would be nearly 100 tons per day, all of which must be collected and disposed of within the bounds of the Exposition, there being no legitimate outlet on land or water for such a purpose.

It is doubtful, in the history of this or any other country, whether there has ever been a sanitary problem of equal magnitude which must be solved in the short time allowed, or which demanded a more safe and scientific solution, than was the one here presented. To make a failure was to imperil the fortunes of the great enterprise, while a success meant not only protection for health, but the comfort and convenience of a great multitude of people.

After the adoption by the Exposition of the Shone hydropneumatic system of sewerage, the question of the final disposal of the product of the sewage sludge and the collection and disposition of the waste and garbage was considered. An exhaustive examination of all methods in use was made by the engineer in charge of the sewerage and water supply of the Exposition, Mr. W. S. MacHarg, of Chicago, resulting in the adoption of the Engle system of destruction by fire.

A contract was entered into with the Exposition authorities by the Engle Sanitary & Cremation Company, of Des Moines, Ia., and New York City, by which the construction of two garbage furnaces to destroy the sewage sludge, garbage, stable refuse, and miscellaneous combustible waste, was guaranteed by the company. The location assigned was a lot 150 × 75 feet in the extreme southeastern part of the grounds, near gate No. 6, and within a short distance of the Anthropological Building, the Forestry Exhibit, and near to the Sewage Cleansing Works, and here were built two Engle garbage cremators, placed together longitudinally with a brick stack 50 feet high.

The details of construction of the Engle furnaces have been printed at length in the Proceedings of the American Public Health Association, and it will at this time be sufficient to summarize this for the benefit of those who may not have seen or do not recall the description. The cremators, including the stack and brick-work connecting with the furnaces,

are 45½ feet long, 17½ feet wide, and 12½ feet high, exterior dimensions. On each side are platforms 21½ feet wide by 57 feet long, reached by an inclined approach of 100 feet. The covering house is 35 feet square, of corrugated iron. There are large sliding doors on two sides, through which the garbage carts discharge their loads upon iron slopes leading from the platform down to the feeding holes of the furnaces. There are two of these slopes which are 20 × 10 feet, and have a storage capacity of ten tons each. The garbage dumped from the carts passes down the slopes into the feeding holes, of which there are four for each furnace, one being large enough to receive the carcass of a horse. It falls upon the transverse grate bars in the upper or main combustion chamber. These bars are made of interlocked fire-clay moulded blocks firmly keyed together, with spaces through which the ashes fall into the lower chamber. The fires are at each end of the upper chamber, one being above and the other below the level of the grates. The main or primary fire is by the action of the draught brought directly over and through the material on the grates, driving the smoke, odors, and gases the length of the chamber and downward into the flame from the second fire. This perfected and complete combustion fills the lower chamber and space beneath the grate, and passes on its way over bridge walls to a second combustion chamber, and finally into the base of the chimney. Every particle of carbon, vapors, gases, and smoke is annihilated or transformed into carbonic acid gas, that is discharged at a temperature of 1000° at the top of the chimney—a thin, colorless, invisible gas, which is immediately dissipated. Of all the chimneys and smoke-stacks within the grounds there is none which shows so little signs of burning fuel as does this one. Connected with the interior of the combustion chambers are inlets which bring hot air from small chambers over the fire-boxes, to which the oxygen is admitted from the outside and heated to a high temperature. Hollow arches over the top, air spaces in the sides, and hot-air pipes from the chimney also assist in furnishing heated air for the combustion of the garbage.

The distinguishing feature of the Engle system is the use of the second fire, destroying the products of combustion from the material burned, and utilizing the heat thus obtained

within the furnace. In the destructors employed in England this is accomplished by a secondary fire called a "fume cremator," placed near the base of the chimney, the heat from which cannot be utilized. Before the introduction of this device their chimneys emitted smoke and offensive odors.

The fuel used at the Exposition furnace is crude petroleum. This is brought by pipe lines directly from the oil fields in Indiana to tanks within the grounds, from which it is pumped into a stand-pipe 30 feet high supplying all the power plants of the Exposition. To atomize the oil, power is obtained by a 12 kilowatt electric motor which drives a Root blower, giving an average pressure of twelve ounces of air per square inch of opening. The form of burner used is the S. C. T. Burner, atomizing by air alone, using no steam. This burner, a late invention of Messrs. Squire, Cobb & Towl, is largely employed by the Standard Oil Company in its pumping stations, and is the only example of its type in use at the Exposition. By an accurate test made by weight and measure of the oil, it is determined that under usual conditions there is used from 5 to 7 gallons of oil per hour by each burner; three burners being usually run in each furnace, the maximum amount of oil required would be from 30 to 42 gallons per hour, but this is greatly reduced during the latter part of the work when, the radiated heat of the furnace being very great, less fuel is required.

There is brought to the cremators at 10 A.M. from 8 to 15 tons, the average quantity being about 10 tons of sewage cake from the Sewerage Cleaning Station. By the Shone system all the sewage from the grounds is forced by compressed air into large receiving tanks at the cleansing station, being about 2,500,000 gallons daily. After treatment with chemicals and the precipitation of solids to the bottom of the receiving tanks, the effluent is run off into the lake and the residuum pumped into sewage presses and formed into sludge cakes 2½ feet in diameter and 1 to 1½ inches thick.

These cakes come directly from the presses to the furnaces, being broken up into fragments in their transfer by carts. An analysis of this sludge gives moisture 58 per cent and dry matter 42 per cent. Of this dry matter there is about 18 per cent of combustible material, being 6 to 8 parts of oily or soapy

material, and 10 to 12 of paper pulp and fœcal waste, the remainder being ash, lime, earth, and chemical and mineral products. Thus only 18 per cent of the original sewage bulk can be actually burned. When exposed to high temperatures in this semi-fluid, viscous condition, the liquids slowly evaporate, and the residuum falls in a yellow powdery ash. It does not burn, as there is so small a percentage which fire can take hold of, but transforms to a condition like burned clay or earth. The ash remaining is far greater in quantity than from an equal amount of garbage, the process is slower, actual results showing that 24 tons of garbage can be burned at a lower temperature in the time required by eight tons of sludge at a far higher heat.

The daily collection of garbage begins at eleven o'clock at night and continues until morning. The carts used are those known as the Hill garbage wagon, a light, water-tight iron body on two wheels, holding 45 cubic feet, with a projecting tailboard allowing the discharge of the contents free from the wheels. They are drawn by one horse and attended by one man.

The garbage comes from the kitchens of the national and State buildings, restaurants, the native villages, and often contains large amounts of coal-ashes. There is no paper, sweepings, or combustible refuse, and but small quantity of excreta from earth closets and vaults. There have been burned the bodies of two camels, four horses, two cows, two deer, one elk, several dogs, and smaller animals. These pass into the upper combustion chamber through the large feeding hole, no preliminary cutting being necessary. The body of the largest horse was consumed in an hour, the smaller animals in much less time. There was no visible discharge from the chimney during their combustion. The mixture of coal-ashes with garbage, which has sometimes been as much as 25 per cent of ash, delays the process of combustion, requiring more time and labor to pass it through the grates, but does not otherwise affect the operation of the furnaces. The quantity of liquids contained in the garbage is very large. After rains there is always a great increase in this ; frequently the carts discharge one third or more of their contents in water.

There are required three shifts of four men each for the

twenty-four hours, which with two engineers and superintendent makes 15 persons employed in the management of the furnaces. Because of their peculiar situation and the fact that the furnaces must always be ready for public inspection, a larger force is employed than would otherwise be necessary for the work. The greater proportion of the work is done between the hours of twelve o'clock midnight and twelve o'clock noon. It could be all done in the six hours from twelve to six o'clock A.M. if the collection could be brought to the furnaces more promptly. The cost of operation and maintenance, including the cost of fuel, is, as nearly as can be reckoned, from 60 to 70 cents per ton. This is larger than has been done at some other of the Engle furnaces, because of the exceedingly refractory character of the sludge destroyed. As before stated, it takes much more heat and labor to destroy the sewage sludge than it does a quantity of garbage three times its bulk, and the product of ashes and consequent labor in handling these is very largely increased. If the ordinary and usual collection of garbage of a city, say, for instance, Chicago, was to be destroyed by this process, and the work carried on by private contractors or by strict oversight on the part of city authorities, it is certain that the cost of operation would be considerably reduced. It is safe to say that 50 cents per ton would represent the cost for this class of garbage. Where the garbage includes the miscellaneous combustible refuse of the city the cost of combustion is still further lessened, as every particle of combustible matter aids in consuming the wet material. For instance, at the city of Savannah, Ga., where there have been two Engle garbage cremators in use for the past four years, the official report of the operation of these furnaces from January 1st to September 1st, 1893, is as in following table.

The cost for destroying the 37,955 cubic yards is $4,457.21, at a net cost of $11\frac{71}{100}$ cents per yard. This does not include horses, cows, etc., which are burned in the cremators—this is garbage only. It is difficult to estimate this quantity by weight, as it includes a large proportion of combustible refuse and a considerable amount of the contents of privy vaults.

During the year 1892 the average cost per cubic yard for fuel and labor at this city (Savannah) was 13 cents.

Garbage, loads	14,922
Cubic yards	37,955
Cows	97
Horses	155
Goats	30
Dogs	1,650
Cats	2,768
Fish	55 bbls.
Meats	7,675 lbs.
Poultry	10,643 hds
Onions	23 bbls.
Oranges	36 lds.
Bananas	31 "
Apples	5 bbls.
Infected goods	651 pieces.
Average amount burned daily	$158\frac{15}{100}$ cub. yds.
Average loads hauled daily	$62\frac{20}{100}$.

As will be seen, the addition to the city garbage proper of combustible refuse tends not only to provide means for the disposal of worthless matter, but to diminish the cost of maintenance of the furnace which destroys the offensive kitchen offal. This record is still further strengthened by reports of a similar character from the cities of Norfolk, Va. ; Richmond, Va. ; Jacksonville ; Panama ; Salt Lake City and Ogden, Utah ; Des Moines, Ia. ; Findlay, O., and many other cities where these furnaces are in use.

The ashes from the destruction of garbage at the Exposition accumulate in a pile outside the house and are used by the authorities of the Exposition in filling such parts of the grounds as had to be brought up to grade. No effort has been made to utilize them for any purpose of fertilization, but they possess undoubted value, as they contain from at least 4 to 6 per cent of potash and a small percentage of phosphoric acid. Repeated analyses of the products of garbage combustion have shown that there is enough value in these ashes, if properly separated from the débris, to very nearly pay for the fuel used in the operation of burning. When used for filling low grounds or making streets they are more valuable than the same amount of earth or gravel. On sandy roads these ashes

pack solid, do not break up under the wheels, and make an elastic and firm track.

The destruction of the garbage of the Exposition has been continuously performed since May 9th, when one furnace went into operation. There has been no cessation ; the daily collection being delivered and disposed of with the utmost rapidity consistent with the sanitary performance of the work, the object being to keep the grounds free from waste and to care for the sewage sludge as fast as produced, so that no offence shall arise, and there need be no large accumulation on hand. This has been perfectly accomplished ; and had it been possible to secure a perfectly trained body of men to operate the furnaces so that experienced help would be sure of being had at all times, the work of operation would have been much simplified. Taking the work of these garbage cremators as a whole, considering the difficulties under which they were constructed, the limited extent of time for which they would be employed, the exceedingly refractory character of the waste to be consumed, and the difficulties incident to the construction, management, and superintendence of the work, the results accomplished have certainly been remarkably successful.

It must be remembered that this destruction is performed under the observation of men experienced in furnace construction—engineers perfectly familiar with all the details of application of heat and power, experts who are responsible for the cleanly condition of the grounds and the comfort of great multitudes of people—and is inspected by thousands of persons interested in examining, for sanitary reasons, the destruction of waste where the slightest sanitary annoyance would be instantly observed and commented upon. To have done this work five months to the entire satisfaction of the Board of Administration and the sanitary engineers of the Exposition is a most striking and conclusive evidence of the value of garbage cremation and of the usefulness of the Engle system when brought into use on a large scale. It is evident that the same work could be performed elsewhere under conditions which could hardly be more exacting with equal success.

There remains in this connection only one thing more to be noted : In most cities throughout the United States the collection service, whether by contract or by municipal work,

collects and transports all the waste of the city in one receptacle. In but comparatively few places is the separation made of putrescible garbage, combustible waste and ashes. The result is an aggregation of material which cannot be destroyed in its original state, which is difficult to separate satisfactorily, and which is entirely worthless from the admixture of putrescible matter which permeates the whole.

The next step demands an apparatus which shall take this material and prepare it for cremation, separating the valuable parts and destroying the rest. It is entirely practical to so arrange a series of screens, sieves, or separative machinery which shall take the mixed garbage, ashes, etc., remove the finer portions of ash, separate the paper, leather, glass, iron, rags, and discharge the residuum into the mouth of the furnace, where it is destroyed. The material which is of value, and which is by this process sorted out, would then be disinfected by steam heat, cleaned and prepared for sale, and the revenue therefrom placed to the credit of the city. If the city of New York can receive $93,000 each year for the privilege of picking over the garbage as it is discharged on the decks of the scows, and if the parties holding this contract can make a large sum of money by this crude, imperfect system of handling this material, it is quite certain that if the work were carried on in a systematic manner a great deal larger revenue would be produced. What is true of New York is true to a greater or less extent in every city of the country. There is to-day hauled out and put upon the dumps, cast overboard, or discharged into garbage cremators, valuable material enough to defray 25 per cent of the cost of the collection service in every place. Under the American system of wasteful living there is thrown out from households a large proportion of food products, which would be reckoned valuable abroad. Under the somewhat lax and irresponsible methods of municipal business conducted by committees and councilmen of this country, there is less attention paid to the economical operation of garbage disposal methods than should be done ; the result is the destruction yearly of a great mass of valuable waste which should be saved at a profit to the city.

Another thing : the heat caused by the destruction of putrescible waste can be perfectly well applied for the produc-

tion of power, which, in its turn, is used for municipal purposes. There goes up the chimney of every garbage cremator in the country heat enough to run a steam boiler of 15 to 40 horse-power. When these garbage destroyers are built as they should be, in connection with other municipal plants where steam is employed, the cost of operation would be greatly diminished, and the necessity of doing the work cleanly and economically will become much more apparent. Our English brethren have made greater progress in this direction than has been done in this country. Their destructors in some cases are self-supporting, from the fact that everything of value is utilized and the heat is turned into active power. The day will come in this country when this will be as much a part of the disposal system as is the construction of the furnaces themselves.

THE DISPOSAL OF EXCRETA

without the intervention of conveyance by sewers is accomplished by the operation of a small fire closet which has been constructed and is at work at the side of the garbage cremators at the World's Exposition. This shows by a small working model what might be done on a larger scale in every schoolhouse, public building, or manufacturing establishment where no drainage can be secured and where the necessity for the disposal of the organic waste is evident. Proceeding upon the same plan of employing two fires, the one disposing of the excreta and the other the products of that combustion, the excreta is received upon the grate bars, the liquid portion passing into the pan underneath, and at the proper time—usually twice each month—is destroyed by the application of fire in the two fire-boxes. The amount of fuel is insignificant, the time required very short, and the operation of destruction inoffensive, unobjectionable and sanitary. This device has been employed in this country for six years, has been found to be a perfectly sanitary substitute for all privy vaults, system of water carriage or earth closets, and is susceptible of being applied at every place where the conditions do not warrant the conveyance of household excreta by drainage. This apparatus will repay a strict investigation and will demonstrate its usefulness under all conditions.

A RECAPITULATION

of the work done at the Exposition up to date may be of interest, though it is necessarily incomplete.

For the five months that the cremators have been used there was about 5,732 tons of sewage cake and garbage brought to the furnaces, also a considerable amount of stable refuse and damaged food products, besides the bodies of 12 large animals. The average weight of a load of sludge cake was found to be 2,700 lbs. and of a load of garbage 2,035 lbs. In these calculations the weight of sludge is assumed at 2,400 lbs. and of garbage at one ton, except in the middle of the summer, when this was slightly larger.

The largest quantity of oil burned in one hour was $71\frac{6}{7}$ gallons used by 6 burners, the average of eight days' test being $37\frac{1}{2}$ gallons per hour, or $6\frac{1}{3}$ gallons for one burner per hour.

One day's trial, during which time the oil, sludge, and garbage were accurately weighed, showed there was destroyed $8\frac{1}{10}$ tons sludge cake, $27\frac{1}{4}$ tons of garbage mixed with large quantities of liquid, the time required being nine hours for the sewage cake and twelve hours for the garbage.

There were burned 895 gallons of oil for fuel. The labor employed extended over the twenty-four hours, the relative proportions of expense for fuel and labor being about $75\frac{1}{2}$ cents for sludge, $67\frac{1}{2}$ cents for garbage per ton.

Taking the cost for fuel and for labor during the time the furnaces were actually operating, the expenses would be considerably reduced, the increased cost being due to the peculiar conditions of night collection of garbage, the necessity for quickly destroying it, and the lapse of time before the sewage cakes are received.

The largest day's work done was the disposal of $21\frac{3}{4}$ tons of sewage cake and $38\frac{1}{4}$ tons of garbage, the time required being about eighteen hours, at a cost for fuel and labor of 60 cents per ton.

Finally, it will be seen that the disposal of city waste by fire can be carried on in the immediate vicinity of dwellings without nuisance or offence, provided the work be done by furnaces adapted to the purpose, and operated by men who are competent. It is demonstrated that not only garbage, refuse,

and dead animals, but also sewage sludge and excreta can be perfectly destroyed when required. It has been shown that the cost of doing this work is as reasonable as can be expected, considering the difficulties which are to be encountered, and that this cost is steadily being reduced as the character of the work becomes better understood and the furnaces are constructed on more scientific plans. It must be evident that a great saving can be made by separating such valuable parts of city waste that can be sold, and thus diminish the cost of operation, and it is certain that the progress made in the direction of waste disposal by fire far outstrips and exceeds all other methods or means which have been developed since the meeting of this Association held two years since.

Since the date of the foregoing paper (October 11th, 1893) the record of work done has been brought down to the end of the Exposition. There have been burned in six months' continuous service the garbage and sewage sludge resulting from the presence of 27,250,000 persons. This work has been appreciated by the authorities and recognized by the award of medals of the highest class for the garbage cremators and the Engle fire closet. The following letter has been received from the chief of the Water and Sewerage Department having charge of this work of disposal of waste:

OFFICE OF D. H. BURNHAM, DIRECTOR OF WORKS,
WORLD'S COLUMBIAN EXPOSITION, JACKSON PARK,
CHICAGO, October 18, 1893.

W. S. MACHARG,
Engineer of Water Supply,
Sewerage and Fire Protection.

W. F. MORSE, ESQ., *The Engle Sanitary and Cremation Company:*

DEAR SIR: In response to your inquiry, I beg leave to say that the Engle furnace was selected by me for use in the World's Fair grounds after a careful examination, and after I had satisfied myself that it was the one upon which perfect dependence could be placed for satisfactory operation; and you can readily understand that upon the opening of the Fair no opportunity would be given for any changes or to correct any errors.

I can say at the present time that the operation of the furnaces have been satisfactory to us in every respect, and that they have completely fulfilled expectations derived from my examinations and all promises made by you.

The work has been done perfectly without creating the slightest nuisance, and the operation could not be perceived fifty feet from the building, nor was the gas escaping from the stack noticeable at any distance.

We are perfectly satisfied with the operation of the furnaces. Very truly yours,

(Signed) W. S. MacHarg,
Engineer.

PROPOSED BUREAU OF PUBLIC HEALTH.

THE following is the final draft of the bill of the Committee on Quarantine of the New York Academy of Medicine, which is to be presented to Congress during its coming session :

A Bill to establish within the Treasury Department a Bureau of Public Health.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled :

CREATING SANITARY DISTRICTS.

SECTION 1. That for the purposes of this Act the States and Territories of the United States be, and are hereby, grouped into districts, to be known as " The Sanitary Districts of the United States," as follows :

The Northern Sanitary District shall include the States of Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, Wisconsin.

The Northeastern Sanitary District shall include the States of Connecticut, Massachusetts, Maine, New Hampshire, New York, Rhode Island, Vermont.

The Northwestern Sanitary District shall include the States of Idaho, Montana, North Dakota, Oregon, Washington, and the Territory of Alaska.

The Eastern Sanitary District shall include the States of Delaware, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia, and the District of Columbia.

The Western Sanitary District shall include the States of California, Nevada, and the Territories of Arizona and Utah.

The Southern Sanitary District shall include the States of Arkansas, Alabama, Kentucky, Louisiana, Missouri, Mississippi, Tennessee.

The Southeastern Sanitary District shall include the States of Florida, George, North Carolina, South Carolina.

The Southwestern Sanitary District shall include the State of Texas and the Territories of Indian Territory, New Mexico, Oklahoma.

The Central Sanitary District shall include the States of Colorado, Kansas, Nebraska, South Dakota, Wyoming.

SEC. 2. That there shall be established in the Treasury Department, under the direction and supervision of the Secretary thereof, a Bureau of Public Health, to consist of a commission of fifteen, of whom eleven shall be appointed by the President, by and with the advice and consent of the Senate, as follows—viz.: One Medical Commissioner from each of the "Sanitary Districts of the United States," provided in section one of this Act, and two commissioners at large; the compensation of the appointed commissioners, when actually engaged in the performance of their duties under this Act, shall be ten dollars per diem and reasonable expenses. The other four members of the Commission shall be the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Supervising Surgeon-General of the Marine Hospital Service, and an officer, learned in the law, detailed by the Attorney-General from the Department of Justice; these four members shall receive no compensation.

SEC. 3. That the members of the Commission shall meet at such time and place as may be designated by the Secretary of the Treasury, and organize by the election, from their own number, of a president who shall be one of the members at large, and who shall receive five dollars per diem, in addition to the ten dollars per diem provided in the last section, when actually engaged in the performance of his duties under this Act. The other member-at-large shall be Vice-President of the Commission, who shall perform the duties of President when the latter is unable to do so. The Commission may appoint a Secretary not one of its number, and fix his salary

at a sum not exceeding three thousand dollars annually. The Commission shall thereafter meet annually, at Washington, on the first Tuesday of October, and at such other times and places as the President of the Commission, with the approval of the Secretary of the Treasury, may designate. At the first meeting of the Commission, the members appointed from sanitary districts shall be divided into three classes, of three members each, and they shall determine by lot to which class each member shall belong ; the first class shall serve for one year, the second class for two years, and the third class for three years ; the two members at large shall serve, one for three years, and the other for six years, and they shall determine by lot their respective terms of service ; thereafter the terms of service of each member appointed from a sanitary district shall be for three years, and each member appointed at large shall be for six years ; all appointments to fill vacancies shall be for the unexpired term.

SEC. 4. That there shall be an Executive Committee of the Commission, consisting of its President, the Surgeon-General of the Army, the Surgeon-General of the Navy, and the Supervising Surgeon-General of the Marine Hospital service, and the officer detailed by the Attorney-General. The Commission shall from time to time prescribe the duties of the Executive Committee, and may make all needful rules and regulations for its own control and for the guidance and discipline of all its officers and employés, and shall establish all rules and regulations for the government of national sanitation in all of its foreign and interstate relations, and special departments in the enforcement of the provisions of this Act.

SEC. 5. That when, in the opinion of the President of the Commission, the interest of the public health would be promoted by a conference of the Commission with the State Boards of Health of the several States, or of any sanitary district or districts, he is hereby authorized to invite, with the approval of the Secretary of the Treasury, said State Board of Health, or such number thereof as he may designate, each to delegate one of its members to meet the Commission in conference at such time and place as he may appoint ; the President of the Commission shall be the President, and the Secretary of the Commission shall be the Secretary of any

such conference; the delegate in attendance upon the conference from each State Board of Health shall be entitled to receive reasonable compensation for expenses for a session not exceeding three days, to be paid on vouchers provided by the Secretary of the Treasury.

SEC. 6. That the duties of the Bureau of Public Health shall be to collect and diffuse information upon all matters affecting the public health; to advise the several departments of the Government, the executives of the several States, and all health authorities on all questions submitted to it, or whenever in the opinion of the Bureau such advice may tend to the preservation and improvement of the public health; to secure the best sanitary condition of vessels from foreign ports; to prevent the introduction of contagious and infectious diseases into the United States, and their spread from one State into another; to co-operate with and aid State and municipal health authorities in the execution and enforcement of rules and regulations to suppress contagious and infectious diseases; and, in general, to be the medium through which the General Government shall adopt such measures and take such action as will most effectually protect and promote the health of the people of the United States.

SEC. 7. That the Bureau of Public Health may, with the approval of the Secretary of the Treasury, make investigations, both in the United States and, if necessary, in foreign countries, into the nature, origin, and prevention of contagious, epidemic, and other diseases, as well as the causes and conditions of particular outbreaks of disease in the United States, and may employ such experts and for such time and in such manner as the exigencies of the service may require. When requested by the Bureau of Public Health, and when the same can be done without prejudice to the public service, the President may detail officers from the several departments of the Government for temporary duty to act under the direction of said Bureau, to carry out the provisions of this act; and such officers shall receive no additional compensation except for actual and necessary expenses incurred in the performance of such duties.

SEC. 8. That as soon as practicable after this act shall take effect the Commissioners appointed from the Sanitary Dis-

tricts shall each in his respective District examine all the means and measures employed by State, municipal, and other health authorities to prevent the introduction of contagious and infectious diseases into the United States, and their spread from one State or Territory into another, and report the fact to the Bureau of Public Health, and the Commission shall embody these facts in a report to the Secretary of the Treasury, who shall transmit the same to Congress with such recommendations as he may deem important. Thereafter each Commissioner shall annually, on or before October 1st, report upon the measures employed, with the result, in his Sanitary District to prevent the introduction, origin, and spread of contagious and infectious diseases, and the Commission shall embody the facts in its annual report to the Secretary of the Treasury.

SEC. 9. That it shall also be the duty of the Bureau of Public Health to obtain information of the sanitary condition of foreign ports and places from which contagious and infectious diseases are or may be imported into the United States, and to this end the consular officers of the United States at such ports and places as shall be designated by the Bureau of Public Health shall make to said Bureau weekly reports of the sanitary condition of the ports and places at which they are respectively stationed, according to such forms as said Bureau may prescribe; and the Bureau of Public Health shall also obtain, through all sources accessible, including State and municipal sanitary authorities throughout the United States, weekly reports of the sanitary condition of ports and places within the United States; and shall also, as far as it may be able, by means of the voluntary co-operation of State and municipal authorities, of public associations, and private persons, procure information relating to the climatic and other conditions affecting the public health, and the existence of epidemic, endemic, and other diseases; also statistics relating to marriages, births, and deaths.

SEC. 10. That the Commission shall prepare, publish, and transmit to the medical officers of the Army, Navy, and the Marine Hospital Service, to collectors of customs, and to State and municipal health officers and authorities, weekly abstracts of the consular sanitary reports and other pertinent information received by the Bureau of Public Health.

SEC. 11. That whenever any department of Government or the Executive of any State or Territory, or the authorities of the District of Columbia, or the health authorities of any State or municipality, shall request information from the Bureau of Public Health in regard to any matter pertaining to the protection or promotion of the public health, said Bureau shall promptly furnish such information as it may have on record, together with any necessary or pertinent advice ; and whenever information shall be received by the Bureau which the interests of the public health require should be promptly communicated to any department of the Government, or to any State or municipal officer, such information shall be forthwith furnished to the respective department or officer.

SEC. 12. That the Commission shall take such action by correspondence or conference as will tend most effectually to secure the co-operation of State, municipal, and local boards of health in establishing and maintaining an efficient and accurate system of notification of the existence and progress of contagious and infectious diseases in the United States, and said Commission shall also by co-operation with the proper health authorities of foreign nationalities and municipalities endeavor to extend to the United States a reliable system of international notification of the existence and progress of such diseases as cholera, yellow-fever, typhus-fever, and small-pox.

SEC. 13. That the Bureau of Public Health shall make such rules and regulations, with the approval of the Secretary of the Treasury, as are necessary to be observed by vessels at the port of departure and on the voyage, where such vessels sail from any foreign port or place, to secure the best sanitary condition of such vessel, her cargo, passengers, and crew, which shall be published and communicated to and enforced by the consular officers of the United States. None of the penalties herein imposed shall attach to any vessel, or owner or officer thereof, until a copy of this act, with the rules and regulations made in pursuance thereof, has been posted up in the office of the consul or other consular officer of the United States for ten days, in the port from which said vessel sailed ; and the certificate of such consul or consular officer over his official signature shall be competent evidence of such posting in any court of the United States.

SEC. 14. That the Bureau of Public Health shall, with the approval of the Secretary of the Treasury, from time to time issue to the consular officers of the United States, and to the medical officers serving at any foreign port, and otherwise make publicly known, the rules and regulations made by it, and approved by the Secretary of the Treasury, to be used and complied with by vessels in foreign ports for securing the best sanitary condition of such vessels, their cargoes, passengers, and crew, before their departure for any port in the United States, and in the course of the voyage, and all such other rules and regulations as shall be observed in the inspection of the same on the arrival thereof at any quarantine station at the port of destination, and for the disinfection and isolation of the same, and the treatment of cargo and persons on board, so as to prevent the introduction of cholera, yellow-fever, or other contagious or infectious diseases.

SEC. 15. That it shall be unlawful for any merchant-ship or other vessel from any foreign port or place to enter any port of the United States except in accordance with the provisions of this act, and with such rules and regulations of State and municipal health authorities as may be made in pursuance of, or consistent with, this act; and any such vessel which shall enter, or attempt to enter, a port of the United States in violation thereof shall forfeit to the United States a sum, to be awarded at the discretion of the court, not exceeding $5000, which shall be a lien upon said vessel, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States District Attorney for such district shall appear on behalf of the United States; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 16. That any vessels at any foreign port clearing for any port or place in the United States shall be required to obtain from the consul, vice-consul, or other consular officer of the United States at port of departure, or from the medical officer where such officer has been detailed for that purpose, a bill of health, in duplicate, in the form prescribed by the Secretary of the Treasury, setting forth the sanitary history and condition of said vessel, and that it has in all respects

complied with the rules and regulations in such cases prescribed for securing the best sanitary condition of the said vessel, its cargo, passengers, and crew ; and said consular or medical officer is required, before granting such duplicate bill of health, to be satisfied that the matters and things stated therein are true ; and for his services in that behalf he shall be entitled to demand and receive such fees as shall by lawful regulation be allowed, to be accounted for as required in other cases.

The President, in his discretion, is authorized to detain any medical officer of the Government to serve in the office of the consul at any foreign port for the purpose of furnishing information and making the inspection and giving the bills of health hereinbefore mentioned. Any vessel clearing and sailing from such port without such bill of health, and entering any port of the United States, shall forfeit to the United States not more than $5000, the amount to be determined by the court, which shall be a lien on the same, to be recovered by proceedings in the proper district court of the United States. In all such proceedings the United States District Attorney for such district shall appear on behalf of the United States ; and all such proceedings shall be conducted in accordance with the rules and laws governing cases of seizure of vessels for violation of the revenue laws of the United States.

SEC. 17. That it shall not be lawful for any vessel to enter any port of the United States to discharge its cargo, or land its passengers, except upon a certificate of the health officer at such quarantine station certifying that said rules and regulations have in all respects been observed and complied with, as well on his part as on the part of the said vessel and its master, in respect to the same and to its cargo, passengers, and crew ; and the master of every such vessel shall produce and deliver to the collector of customs at said port of entry, together with the other papers of the vessel, the said bills of health required to be obtained at the port of departure, and the certificate herein required to be obtained from the health officer at the port of entry ; and that the bills of health herein prescribed shall be considered as part of the ship's papers, and when duly certified to by the proper consular or other officer of the United States, over his official signature and

seal, shall be accepted as evidence of the statements therein contained in any court of the United States.

SEC. 18. That the Commission, with the approval of the Secretary of the Treasury, shall have authority to forbid entry of vessels from ports known or suspected to be infected with cholera, yellow-fever, small-pox, or other declared quarantinable disease into all minor approaches to a port of entry or into any inlet or place within the jurisdiction of the United States not provided with a complete quarantine plant, in order to compel such vessels to be subjected to maritime sanitation at the quarantine station equipped for that purpose and commanding the scope of region in question.

SEC. 19. That on the arrival of an infected vessel at any port not provided with proper facilities for treatment of the same, the Commission may remand said vessel, at its own expense, to the nearest national or other quarantine station where accommodations and appliances are provided for the necessary disinfection and treatment of the vessel, passengers, and cargo; and after treatment of any infected vessel at a national quarantine station, and after certificate shall have been given by the United States quarantine officer at said station that the vessel, cargo, and passengers are each and all free from infectious disease, or danger of conveying the same, said vessel shall be admitted to entry to any port of the United States named within the certificate. But at any ports where sufficient quarantine provision has been made by State or local authorities, the Commission may direct vessels bound for said ports to undergo quarantine at said State or local station.

SEC. 20. That when cholera or yellow-fever shall be ascertained by the Bureau to exist in any port or place within any one of the United States or Territories, or the District of Columbia, in such form as threatens its spread to other ports and places within other States, or Territories or the District of Columbia, by means of vessels and vehicles engaged in the transportation of goods or passengers between two or more States, or States and Territories, and the District of Columbia, whether by land or water, the Commission is authorized to adopt such rules and regulations, with the approval of the Secretary of the Treasury, as, in its judgment, may be necessary

in order to prevent the spread thereof from one State or Territory to another or to the District of Columbia, and to employ such inspectors and other persons as may be necessary for the purpose aforesaid ; the Commission may select suitable localities for establishing stations on rivers and other lines of inter-State commerce and travel by railroads, and may cause to be erected necessary temporary buildings for the disinfection of passengers, baggage, cargoes, vessels, and vehicles, and may enforce such rules and regulations relating thereto as may have been prescribed therefor ; it shall be lawful for the Commission to confer upon any local health officer or health board within or near the locality where his or its authority is exercised, power also to enforce the provisions of this act and any rules and regulations made in pursuance thereof ; and any person who shall knowingly disobey or violate any order, rule, or regulation made pursuant to the authority herein conferred shall be deemed guilty of a misdemeanor, punishable by a fine of not less than $500, and by imprisonment for a period of not less than one year.

SEC. 21. That the Commission shall, under the direction of the Secretary of the Treasury, co-operate with and aid State and municipal health authorities in the execution and enforcement of the rules and regulations of such authorities, and in the execution and enforcement of the rules and regulations made by the Commission and approved by the Secretary of the Treasury to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, and into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia ; and all rules and regulations made by the Commission and approved by the Secretary of the Treasury shall operate uniformly and in no manner discriminate against any port or place ; and at such ports and places within the United States as have no quarantine regulations under State or municipal authority, where such regulations are, in the opinion of the Commission, necessary to prevent the introduction of contagious or infectious diseases into the United States from foreign countries, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, and at such ports and places within the United

States where quarantine regulations exist under the authority of the State or municipality which, in the opinion of the Commission, are not sufficient to prevent the introduction of such diseases into the United States, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, the Commission shall, if in its judgment it is necessary and proper, make such additional rules and regulations as are necessary to prevent the introduction of such diseases into the United States from foreign countries, or into one State or Territory or the District of Columbia from another State or Territory or the District of Columbia, and when said rules and regulations have been made they shall be promulgated by the Commission and enforced by the sanitary authorities of the States and municipalities, where the State or municipal health authorities will undertake to execute and enforce them ; but if the State or municipal authorities shall fail or refuse to enforce said rules and regulations, the President shall execute and enforce the same and adopt such measures as in his judgment shall be necessary to prevent the introduction or spread of such diseases, and may detail or appoint officers for that purpose.

SEC. 22. That whenever the proper authorities of a State shall surrender to the United States the use of the buildings and disinfecting apparatus at a State quarantine station, the Commission shall cause an examination thereof to be made by its own members or by a competent person, or persons, and if the said station, buildings, and disinfecting apparatus be found adapted to the purposes of a quarantine, and the Commission approve of their use as such, the Secretary of the Treasury shall be authorized to receive them, and to pay a reasonable compensation to the State for their use.

SEC. 23. That all orders, rules, and regulations of the Bureau of Public Health relating to sanitation in any branch of the Public Service, or to prevent the introduction of contagious and infectious diseases into the United States, and their spread from one State or Territory into another State or Territory, or the District of Columbia, through or by means of any branch of the Public Service, the medical officers of such service shall execute such orders, rules, and regulations, and to this end the Surgeon-General of the Army shall perform all

such duties in respect to the Army, the Surgeon-General of the Navy shall perform all such duties in respect to the Navy, and the Surgeon-General of the Marine Hospital Service shall perform all such duties in respect to quarantine and quarantine regulations which are provided by this act.

SEC. 24. That whenever the Commission shall certify to the President, and it shall appear to his satisfaction that, by reason of the existence of cholera or other infectious or contagious diseases in a foreign country, there is serious danger of the introduction of the same into the United States, and that notwithstanding the quarantine defence this danger is so increased by the introduction of persons or property from such country that a suspension of the right to introduce the same is demanded in the interest of the public health, the President shall have power to prohibit, in whole or in part, the introduction of persons and property from such countries or places as he shall designate, and for such period of time as he may deem necessary.

SEC. 25. That the Bureau of Public Health shall make an annual report of its operations to the Secretary of the Treasury, who shall transmit the same to Congress, with such recommendations as he may deem important to the public interests; and said report, if ordered to be printed by Congress, shall be done under the direction of the Board; and that all mail matter of whatever class relative to the Bureau of Public Health and its duties, and addressed to its secretary and indorsed "Official Business, Bureau of Public Health," shall be transported free of postage; and if any person shall make use of any such indorsement to avoid the payment of postage on his private letter, package, or other matter in the mail, the person so offending shall be guilty of a misdemeanor, and be subject to a fine of $500, to be prosecuted in any court of competent jurisdiction.

SEC. 26. That there shall be, and hereby is, appropriated, out of any moneys in the Treasury not otherwise appropriated, the sum of $1,000,000, to be expended, or so much of the same as may be necessary from time to time, under the direction of the President and according to his discretion, to meet emergencies arising in the execution of the provisions of this act.

SEC. 27. Repealing Section.

MORTALITY AND MORBILITY STATISTICS.

By Harry Kent Bell, M.D.

Alabama.—Jerome Cochrane, M.D., State Health Officer, Montgomery.

Mobile, 31,076: T. S. Scales, M.D., Health Officer, reports for the month of September a mortality of 79, of which 47 were colored, and 19 were under five years of age. The annual death-rate per 1000 was 30.48.

Zymotic diseases caused 16 deaths, and consumption, 9.

Arkansas.—D. W. Holman, Secretary, Little Rock.

California.—J. R. Laine, M.D., Secretary, Sacramento.

Reports from ninety cities, towns, villages, and sanitary districts, aggregating a population of 738,180, show a total mortality of 898 from all causes during the month of September. This corresponds to a death-rate of 1.28 per month, or 14.64 per annum per 1000.

There were 140 due to consumption, 46 to acute pneumonia, 23 to bronchitis, 12 to congestion of the lungs, 18 to diarrhœa and dysentery, 24 to cholera infantum, 76 to other diseases of the stomach and bowels, 12 to diphtheria, 32 to typhoid-fever, 6 to malarial fevers, 4 to cerebro-spinal-fever, 32 to cancer, 74 to diseases of the heart, 7 to alcoholism, and 392 to all other causes.

Los Angeles reports five deaths from typhus-fever. Up to this time it was not generally known that this extremely contagious disease had obtained a foothold in California. There was one death from leprosy at Downieville.

San Francisco, 330,000: Total mortality, 468. Consumption, 73.

Los Angeles, 65,000: Total mortality, 82. Consumption, 82.

Sacramento, 30,000: Total mortality, 31. Consumption, 31.

CONNECTICUT.—Professor C. A. Lindsley, M.D., Secretary, New Haven.

The mortality report for September has been received from 167 towns in the State, in a population of 797,000.

There were 1061 deaths reported during the month. This was 373 less than in August, and 3 less than in September, 1892, and 11 more than the average number of deaths in September for the five years preceding the present.

The number of deaths in the first nine months of this year compared with the same of each of the five years preceding was as follows: 1893, 11,165; 1892, 11,679; 1891, 10,125; 1890, 10,393; 1889, 9352; 1888, 9847.

The death-rate was 16.5 for the large towns; for the small towns 14.5, and 15.9 for the whole State.

The deaths from zymotic diseases were 312, and from consumption, 109.

The Medical Practice Act.—The law which prohibits any person in Connecticut from treating, operating, or prescribing for any injury, deformity, ailment or disease, actual or imaginary, of another person, or practising surgery or midwifery, for compensation, unless or until he has obtained a certificate of registration, took effective operation on October 1st.

The interval between the passage of the law, May 25th, and that date, has been well utilized by the medical practitioners of the State in securing their certificates. Eleven hundred and seventy-one names were registered before October 1st.

A considerable number of those who have sent the required statements have signed them by making a mark in the presence of a witness, being unable to write their names. The illiteracy of a large number is not at all creditable to the profession in Connecticut from a scientific standpoint.

New Haven, 90,000: Total mortality, 120. Annual death-rate per 1000, 16.0.

Bridgeport, 58,243: Total mortality, 91. Annual death-rate per 1000, 18.15.

Hartford, 56,000: Total mortality, 79. Annual death-rate, 14.3 per 1000.

Waterbury, 38,500: Total mortality, 46. Annual death-rate, 14.3 per 1000.

Meriden, 26,510 : Total mortality, 37. Annual death-rate per 1000, 16.7.

Norwich, 24,000 : Total mortality, 30. Annual death-rate per 1000, 14.8.

DELAWARE.—E. B. Frazer, Secretary, Wilmington.

DISTRICT OF COLUMBIA, 250,000 : C. M. Hammett, M.D., Health Officer, reports for the four weeks ending October 28th, a mortality of 433, of which number 178 were of colored people, and 133 were under five years of age. The annual death-rate was 19.7 per 1000. There were 88 deaths from zymotic diseases, and 52 from consumption.

FLORIDA.—Joseph Y. Porter, M.D., Secretary, Jacksonville.

The summary, as published in *Florida Health Notes* for the month of August, is as follows :

Number of counties reporting, 43 ; number of cities reporting, 3 ; total population of said counties and cities, 361,984 ; number of births reported, 437 ; number of marriages reported, 293 ; number of deaths reported, 279 ; birth-rate per 1000 per annum, 11.7 ; death-rate per 1000 per annum, 9.25 ; average age of decedents, 27.63 ; number of deaths under five years of age, 96.

ILLINOIS.—J. W. Scott, Secretary, Springfield.

Chicago, 1,600,000 : A. R. Raynolds, M.D., Commissioner, reports 2222 deaths during September, representing an annual death-rate of 16.66 per 1000.

The mortality under the age of five years was 1135. The deaths from zymotic diseases numbered 643, and from consumption, 179.

INDIANA.—C. N. Metcalf, M.D., Secretary, Indianapolis.

IOWA.—J. F. Kennedy, M.D., Secretary, Des Moines.

From the *Monthly Bulletin* of the State Board of Health we quote the following reports for September :

Burlington, 30,000 : Total mortality, 23. Annual death-rate per 1000, 9.20.

Council Bluffs, 35,000 : Total mortality, 23. Annual death-rate per 1000, 7.88.

Davenport, 34,500 : Total mortality, 42. Annual death-rate per 1000, 14.6.

Des Moines, 78,846 : Total mortality, 45. Annual death-rate per 1000, 6.8.

Dubuque, 40,000 : Total mortality, 47. Annual death-rate per 1000, 14.1.

Sioux City, 37,500 : Total mortality, 14. Annual death-rate per 1000, 4.4.

KANSAS.—M. O'Brien, M.D., Secretary, Topeka.

KENTUCKY.—J. N. McCormack, M.D., Secretary, Bowlirg Green.

LOUISIANA.—L. F. Salomon, M.D., Secretary, New Orleans.

New Orleans, 254,000 — 184,500 white, 69,500 colored. There were reported for four weeks ending October 21, 473 deaths, of which number 160 were among the colored people, and 123 of children under five years of age. There were 62 deaths due to zymotic diseases, and 60 to consumption. The annual death-rate was 24.28 per 1000.

MAINE.—A. G. Young, M.D., Secretary, Augusta.

MARYLAND.—James A. Steuart, M.D., Secretary, Baltimore.

Baltimore, 455,427 : James F. McShane, M.D., Commissioner, reports for September that the total deaths were 665, a decrease of 76 compared with the corresponding month of September, 1892. Of these 504 were whites and 161 colored ; a death-rate of 15.72 per 1000 for the former, and 27.21 per 1000 for the latter. The death-rate per 1000 for the whole population was 17.53. Nineteen died from infectious diseases, 89 from consumption, 15 from pneumonia, 15 from bronchitis, 33 from cholera-infantum, 3 from cholera morbus, 10 from diarrhœa, 6 from dysentery, and 9 from entero-colitis, 3 from gastritis, and 13 from enteritis ; 267, or 40.15 per cent. of the total deaths, were in children under five years of age.

During the month 58 cases of infectious diseases were reported, a decrease of 3 compared with the preceding month.

MASSACHUSETTS.—S. W. Abbott, M.D., Secretary, Boston. *Boston*, 487,397 : S. H. Durgin, M.D., Chairman.

There were 943 deaths reported in September, of which number 418 were under five years of age. The annual death-rate per 1000 was 23.21. There were 222 deaths from zymotic diseases, and 118 from consumption.

MICHIGAN.—Henry B. Baker, M.D., Secretary, Lansing.

For the month of October, 1893, compared with the preceding month, the prevailing direction of the wind was southeast (instead of west), the velocity was 20 per cent greater, the temperature was 9.03° lower, the rainfall at Lansing was 2.21 inches more, the absolute humidity was much less, the relative humidity was slightly more, the day and the night ozone were more, and the height of the ground above the water in the well at Lansing was three inches more.

For the month of October, 1893, compared with the preceding month, bronchitis, typhoid-fever, and influenza increased, and cholera morbus, cholera infantum, dysentery, and diarrhœa decreased in area of prevalence.

For the month of October, 1893, compared with the average for corresponding months in the seven years 1886–92, the prevailing direction of the wind was southeast (instead of northwest and southwest), the velocity was 19 per cent greater, the temperature was 3.27° higher, the rainfall at Lansing was 2.55 inches more, the absolute and the relative humidity were more, the day ozone was slightly more, the night ozone was less, and the height of ground above the water in the well at Lansing was two inches less.

Compared with the average for the month of October in the seven years 1886–92, typhoid-fever was more prevalent, and diphtheria, typho-malarial-fever, intermittent-fever, remittent-fever, erysipelas, inflammation of kidney, influenza, and consumption were less prevalent in October, 1893.

Including reports by regular observers and others, typhoid-fever was reported present in Michigan in the month of October, 1893, at one hundred and nine places ; scarlet-fever, at

seventy-eight places; diphtheria, at sixty-six places; and measles, at seven places; consumption was reported present by 35 per cent of the observers making weekly card-reports.

Reports from all sources show typhoid-fever reported at thirty-four places more, scarlet-fever at eleven places more, diphtheria at ten places more, and measles at two places less in the month of October, 1893, than in the preceding month.

MINNESOTA.—C. N. Hewitt, M.D., Secretary, Red Wing.

St. Paul, 155,000: H. F. Hoyt, M.D., Commissioner, reports for the month of September a total mortality of 127, of which 65 were under five years of age. The death-rate per 1000 was 9.83. The number of deaths from zymotic diseases was 39; from consumption, 6.

Minneapolis, 223,700: E. S. Kelley, M.D., Commissioner.

During the month of September, 1893, there were 197 deaths, representing an annual death-rate of 8.80 per 1000. Zymotic diseases caused 62 deaths, and consumption, 18. There were 74 deaths under five years of age.

MISSISSIPPI.—Wirt Johnson, M.D., Secretary, Jackson.

MISSOURI.—R. C. Atkinson, M.D., Secretary, St. Louis.

Kansas City, 150,000: A. M. Crow, M.D., Sanitary Superintendent, reports for September 119 deaths, of which number 41 were under five years of age. The annual death-rate per 1000 was 9.52. There were 19 deaths from zymotic diseases, and 14 from consumption.

NEBRASKA.—F. D. Haldeman, M.D., Secretary, Ord.

NEW HAMPSHIRE.—Irving A. Watson, M.D., Secretary, Concord.

NEW JERSEY.—Ezra M. Hunt, M.D., Secretary, Trenton.

Hudson County, 301,298: C. J. Rooney, Clerk, reports for September 464 deaths, of which 212 were under five years of age. Annual death-rate, 21.9 per 1000.

From zymotic diseases there were 99 deaths, and from consumption, 58.

Paterson, 92,793: J. L. Leal, M.D., Health Officer, reports

for September 161 deaths, 77 of which were under five years of age. The annual death-rate per 1000 was 21.08. There were 48 deaths from zymotic diseases, and 16 from consumption.

NEW YORK.—Lewis Balch, M.D., Secretary, Albany, reports in the *Monthly Bulletin* as follows :

The 9346 deaths reported in September represent an average daily mortality of 311, against 356 in August and 319 in September, 1892 ; the average daily mortality for the nine months of the year has been 348. The death-rate for the State is about 17.90, that of 150 cities, villages, and populous towns being 19.00, and of the rural towns reporting 17.00. The decrease in mortality has been chiefly in the populous cities, the death-rate in rural towns being fully up to the average. Zymotic diseases caused 2319 deaths, or a little less than one fourth of the total mortality (24.8 per cent), the average for September being 25.1 ; in August about 30 per cent was from this cause. Typhoid-fever shows less than the usual increase, having caused fewer deaths than in September of last year, when it also showed a moderate prevalence ; it is nowhere reported as prevalent and all parts of the State show the diminution. Scarlet-fever has steadily diminished in mortality through the year and but 34 deaths are reported from it, almost all of them from the large cities ; Gouverneur and Schuylerville recently report its prevalence. Diphtheria has increased and caused more deaths than in last September (410 to 374) ; in the southern tier district its prevalence continues and in the east central it has increased. Diarrhœal diseases have also caused a larger mortality than usual for this month. Small-pox increased in the maritime district, where the 23 deaths occurred, one of them being reported from Yonkers ; a case of varioloid, originating in New York, has developed at Newton's Corners, in Hamilton County. Consumption has caused fewer deaths (910) than in any month for two years. The weather during the month was characterized by variable temperature, the average mean of 60° being 3° below the normal. The excessive rainfall of August was followed by a slight deficiency ; the relative humidity was higher and the total movement of wind greater.

New York, 1,860,803 : Total deaths, 3031—1385 under five years. Death-rate, 19.80. Zymotic diseases per 1000 deaths from all causes, 236.50. Deaths from consumption, 333.

Brooklyn, 978,394 : Total deaths, 1575—789 under five years. Death-rate, 19.34. Zymotic diseases per 1000 deaths from all causes, 220.32. Deaths from consumption, 163.

Syracuse, 91,944 : Total deaths, 135—55 under five years. Death-rate, 17.62. Zymotic diseases per 1000 deaths from all causes, 296.30. From consumption, 12.

Albany, 98,000 : Total deaths, 137—39 under five years. Death-rate, 16.70. Zymotic diseases per 1000 deaths from all causes, 157.60. From consumption, 24.

Buffalo, 300,000 : Total deaths, 536—289 under five years. Death-rate, 26.44. Zymotic diseases per 1000 deaths from all causes, 371.35. From consumption, 30.

Rochester, 150,000 : Total deaths, 207—76 under five years. Death-rate, 16.70. Zymotic diseases per 1000 deaths from all causes, 268.40. From consumption, 21.

North Carolina.—Richard H. Lewis, M.D., Secretary, Raleigh.

From the *Bulletin* of the North Carolina Board of Health we find that during August there were 175 deaths in 24 towns, aggregating 121,504 population ; 94 were of colored people, and 57 were of children under five years of age.

The annual death-rates were 13.7 per 1000 for the white population, 22.4 for the colored population, and 17.3 for the total. There were 16 deaths from consumption, 16 from typhoid-fever, 19 from malarial fevers, and 25 from diarrhœal diseases.

Asheville, 12,000 : Total deaths, 15. Annual death-rate, 15.0 per 1000.

Charlotte, 14,000 : Total deaths, 15. Annual death-rate, 12.8 per 1000.

Raleigh, 15,000 : Total deaths, 21. Annual death-rate, 16.8 per 1000.

Wilmington, 22,000 : Total deaths, 40. Annual death-rate, 21.8 per 1000.

North Dakota.—F. H. DeVaux, M.D., Superintendent, Valley City.

OHIO.—C. O. Probst, M.D., Secretary, Columbus.

The *Monthly Sanitary Record* furnished the following report for the month of September: Forty-seven cities and towns, having an aggregate population of 1,234,418, returned 1649 deaths, of which number 591 were under five years of age. The annual death-rate was 15.18 per 1000. Zymotic diseases caused 472 deaths, and consumption, 165.

One hundred and eleven villages, with an aggregate population of 165,969, returned 283 deaths, of which number 71 were under five years of age. The annual death-rate was 19.01 per 1000. Zymotic diseases caused 102 deaths, and consumption, 19.

OKLAHOMA TERRITORY.—J. O. Overton, M.D., Secretary, Kingfisher.

PENNSYLVANIA.—Benjamin Lee, M.D., Secretary, Philadelphia.

Philadelphia, 1,115,562: M. Veale, Health Officer, reports: In the four weeks ending October 28th, 1893, there were 1427 deaths, of which number 488 were under five years of age. Annual death-rate, 16.6 per 1000. Deaths from consumption numbered 152, and from zymotic diseases, 238.

Pittsburg, 264,000: J. Guy McCandless, M.D., Registrar, reports: During the four weeks ending October 28th, 1893, there were 359 deaths, of which 155 were under five years of age. Annual death-rate, 17.57 per 1000. Zymotic diseases caused 80 deaths, and consumption, 28.

RHODE ISLAND. ——, Secretary, Providence.

The medical correspondents in the various parts of the State report a less degree of general sickness than for the preceding month, though some diseases show a greater prevalence in certain localities.

Compared with September, 1892, there was but a slight increase in the general sickness, but in no greater ratio than for the last two years.

The number of deaths recorded in the different towns and cities, from which returns have been received, was 535 in an estimated population of 318,103. Annual death-rate, 20.10 per 1000.

SOUTH CAROLINA.—H. D. Frazer, M.D., Secretary, Charleston.

SOUTH DAKOTA.—C. B. Alford, M.D., President, Huron.

TENNESSEE.—J. Berrien Lindsley, M.D., Secretary, Nashville.

The principal diseases, named in the order of their greater prevalence, in the State for the month of September, were: Malarial-fever, typhoid-fever, whooping-cough, scarlet-fever, dysentery, lung diseases (acute), consumption, diphtheria, pneumonia, mumps, catarrh, diarrhœa, cerebro-spinal-meningitis, and chicken-pox.

Chattanooga, 27,000 white and 13,000 colored: Total deaths, 27—13 of which were colored, and 9 under five years of age. Annual death-rates, 6.2 for the white population, and 12.00 for the colored, per 1000.

Memphis, 33,800 white and 27,700 colored: Total deaths, 87—51 of which were colored, and 28 under five years of age. Annual death-rates, 12.78 white, and 22.09 colored, per 1000.

Knoxville, 31,273 white and 9112 colored: Total deaths, 44—16 of which were colored, and 15 under five years of age. Annual death-rates, 10.7 white, and 21.06 colored, per 1000.

Nashville, 54,595 white, 33,159 colored: Total deaths, 109—53 of which were colored, and 38 under five years of age. Annual death-rates, 12.30 white, and 19.17 colored, per 1000.

WASHINGTON.—G. S. Armstrong, M.D., Secretary, Olympia.

WEST VIRGINIA.—N. D. Baker, Secretary, Martinsburg.

WISCONSIN.—J. T. Reeve, M.D., Appleton.

Milwaukee, 260,000: U. O. B. Wingate, M.D., Commissioner.

During the month of September there were 402 deaths reported, 249 of which were under five years of age. The annual death-rate was 18.50 per 1000. Zymotic diseases caused 265 deaths, and consumption, 15.

PROVINCIAL BOARD OF HEALTH OF ONTARIO.—Peter H. Bryce, M.D., Secretary, Toronto.

PROVINCE OF QUEBEC.—Elzear Pelletier, M.D., Secretary, Montreal.

BUENOS AYRES, 567,408: Albert B. Martinez, Director-General of Municipal Statistics.

MORTALITY STATISTICS ABROAD FOR THREE MONTHS ENDING SEPTEMBER 30TH, 1893.

Population, total number of deaths, annual death-rate per 1000, and deaths from small-pox:

London, 4,305,551; 22,009; 20.4; 49. Glasgow, 677,883; 3514; 20.7; 1. Liverpool, 515,507; 3621; 28.1. Manchester, 510,486; 3223; 25.3; 3. Birmingham, 487,897; 2695; 22.1; 9. Leeds, 382,094; 2282; 23.9. Dublin, 349,594; 2289; 26.2. Sheffield, 333,922; 2082; 24.9. Edinburgh, 265,672; 1209; 18.2; 1. Belfast, 265,123; 1779; 26.8. Bristol, 225,146; 902; 16.0. Bradford, 221,611; 1227; 22.1; 31. Nottingham, 220,551; 1042; 18.9. Hull, 208,639; 1379; 26.4. Salford, 203,427; 1267; 24.9; 4. Newcastle, 197,026; 1065; 21.6. Portsmouth, 167,284; 785; 18.8. Norwich, 104,176; 510; 19.6. Amsterdam, 406,302; 1901; 18.7. Rotterdam, 203,486; 1104; 21.7; 26. The Hague, 156,497; 773; 19.8; 1. Paris, 2,424,705; 11,480; 18.9; 82. Lyons, 438,077; 2099; 19.2. St. Étienne, 133,443; 698; 20.9. Nantes, 127,482; 1121; 35.2. Havre, 116,369; 1093; 37.6; 1. Rouen, 111,847; 800; 28.6; 5. Rheims, 105,408; 656; 24.9; 1. Nice, 97,720; 553; 22.6; 1. Nancy, 87,110; 532; 34.4; 1. Besançon, 54,636; 292; 21.4; 18. Berlin, 1,714,938; 10,345; 24.1. Hamburg, 581,608; 3207; 22.1. Leipzig, 388,479; 2878; 29.6. Munich, 380,000; 2774; 29.1. Breslau, 324,143; 2827; 34.9. Dresden, 304,519; 1966; 25.8. Cologne, 297,000; 1970; 26.5. Magdeburg, 224,303; 1727; 30.8. Frankfort, 193,144; 895; 18.5. Hanover, 175,920; 1187; 27.0. Königsberg, 167,099; 1280; 30.6. Düsseldorf, 159,858; 1016; 25.4. Nuremberg, 156,902; 967; 24.7. Altona, 153,490; 693; 18.1. Chemnitz, 152,004; 1390; 36.6. Elberfeld, 134,745; 641; 19.0. Stuttgart, 134,517; 719; 21.4. Bremen, 131,082; 726; 22.2.

Strassburg, 129,450; 720; 22.2. Dantzig, 124,849; 951; 30.5. Stettin, 123,198; 995; 32.3. Barmen, 122,899; 592; 19.3. Crefeld, 113,198; 597; 21.1. Halle, 111,435; 912; 32.7. Aix-la-Chapelle, 107,472; 852; 31.7. Essen, 85,753; 503; 23.5. Berne, 47,620; 219; 18.4. Basle, 75,114; 319; 17.0. Geneva, 78,777; 353; 17.9. Lausanne, 35,623; 153; 17.2. Zurich, 103,271; 435; 16.8. Chaux-de-Fonds, 27,511; 105; 15.3. Brussels, 488,188; 2306; 18.9; 2. Vienna, 1,435,931; 7360; 20.5. Buda-Pesth, 539,516; 3330; 24.7. Prague, 322,910; 1738; 21.5; 7. Trieste, 158,549; 1025; 25.9; 65. Gratz, 115,006; 696; 24.2. Brünn, 96,761; 641; 26.5. Cracovie, 77,144; 683; 35.4; 10. Debreczin, 60,476; 437; 28.9. Presbourg, 57,190; 454; 31.8. Pilsen, 52,406; 301; 23.0. Linz, 48,868; 343; 28.1. Copenhagen, 334,000; 1847; 22.1. Stockholm, 249,246; 1016; 16.3. Gothenburg, 108,969; 362; 13.3; 2. Christiania, 156,500; 718; 18.4. St. Petersburg, 954,400; 7220; 16.3; 11. Moscow, 753,469; 8461; 44.9; 11. Warsaw, 500,931; 3158; 25.2; 105. Odessa, 315,900; 2410; 30.5; 7. Turin, 335,126; 1273; 15.2. Genoa, 200,495; 1081; 21.6; 2. Venice, 162,326; 783; 19.3; 1. Bologne, 141,750; 774; 21.8. Cairo, 353,188; 5292; 59.9; 7. Damiette, 43,502; 315; 29.0; 2. Suez and Ismalia, 12,406; 160; 51.6. Port Said, 10,693; 225; 84.2.

Peroxide of Hydrogen as a Water-Purifier.—Peroxide of hydrogen has long been recognized as a powerful disinfectant, and has been recommended and used with advantage as a gargle in cases of diphtheria, and in this respect has recently been again brought forward as a most useful means of protection against this disease during an epidemic. But it has also been used as a handy method of removing bacteria from drinking water for household purposes during outbreaks of cholera or other zymotic diseases. It is stated on the authority of careful scientific experiments that an addition of one part of this material to one thousand parts of the water, when allowed to stand for twenty-four hours, will effectually destroy any cholera or typhoid germs which may be present. The taste of the water does not suffer any alteration, and it is perfectly harmless. But in case this expedient should be tried it must

be borne in mind, first, that the particular peroxide of hydrogen employed must be the purest purchasable, as it may contain minute traces of the poisonous barium chloride; and, secondly, that to insure its acting efficiently on the microbes, the samples used must be freshly prepared.

VICTIMS TO DUTY.—*The Lancet* says: "One more name has to be added to the roll of those young members of our profession who have perished on the threshold of a promising career, while actually engaged in the attempt to save the lives of others. We regret to learn that Mr. W. F. Lucas, casualty medical officer to the Middlesex Hospital, died in that institution on Monday last from diphtheria contracted in the discharge of his duties." *The Boston Medical and Surgical Journal* adds this: "Every physician knows many instances where his professional comrades have fallen by his side, struck down by infectious fevers or septic absorption received at the bedside of a patient. Notable instances have recently brought this peril afresh to our minds. A contemporary journal, in the last issue, records the death of a practising physician who caught the infection of yellow-fever from a patient whom he was attending, and also the death of a promising young doctor to whom the infection of typhoid-fever was communicated from a child patient at New York Hospital. Last week it was our melancholy duty to report the death of a brilliant young physician of unusual qualities of mind and heart, who caught diphtheria from a patient at the Boston City Hospital."

EUROPHEN IN RECTAL ULCER AND KRAUROSIS. — In "Notes for Practice," Dr. Waugh writes as follows in the *Times and Register* of July 1st, 1893: "The value of europhen was strikingly developed in a lady aged twenty, who complained of morning diarrhœa. Digital examination revealed a deep sensitive ulcer within the sphincter ani. I ordered europhen ointment to be applied twice daily with the finger, the bowel to be washed out nightly with a pint of hot water, in which was dissolved half a drachm of sulpho-carbolate of zinc. Internally I gave three pills of 1 grain each of iodoform.

Within two weeks the ulcer had cicatrized. In kraurosis, or atrophy and dryness of the mucous membrane of the vagina, the writer states that the only remedy previously known was phenic acid. The author employed europhen ointment (30 grains to 1 ounce of lanolin) with uniform success. In the first case intercourse had been painful for seven years. On the application of europhen tenderness at once began to subside, and in a few weeks coitus was no longer unpleasant. Complete recovery ensued. The next case was of a lady suffering from great pain at the menstrual period, pain in the back, and continuous hyper-excitability. Faradization of the back was employed, together with europhen ointment, as in the preceding case. In two months the cure was complete. The third case was that of a woman who had suffered from kraurosis during the eight years of her married life. Europhen ointment effected a cure in four weeks."

Aristol in Psoriasis.—Aristol was recommended as long ago as 1890 by Dr. Schirren, who successfully employed it in psoriasis guttata and p. vulgaris. He made use of a paste of 10 per cent aristol with zinc and starch, though in certain cases he found a 10 per cent ointment of aristol with lanolin, or even the dry powder preferable. The scales loosened on the second day. Complete cure was obtained in six cases, and in one case of p. numularis, pruritus ceased on the first day. Later (in July, 1891) Dr. Barclay found ample confirmation of Schirren's results, and he wrote to the *British Medical Journal* (July 11th, 1891) that he desired "to recommend aristol as an excellent remedy for psoriasis. Still later Dr. Weissblum reported twenty-three cases of psoriasis successfully treated with 10 to 20 per cent ointments of aristol, and similar results have been obtained by other observers. There have been some failures, and some cases in which the treatment appears to have been early discontinued, but the conclusion seems to be general that in psoriasis aristol should be perseveringly tried. In a recent article on psoriasis, by Dr. R. C. Longfellow (*Atlanta Medical and Surgical Journal*, September, 1893), the author recommends aristol in ointment of roses as "the safest and least objectionable of local applications."

EDITOR'S TABLE.

SANITARIAN, DECEMBER NUMBER, 1893.

☞ALL correspondence and exchanges and all publications for review should be addressed to the Editor, DR. A. N. BELL, Brooklyn, N. Y.

REPORT OF THE SURGEON-GENERAL U. S. NAVY, FOR THE FISCAL YEAR ENDING JUNE 30TH, 1893.

NAVAL hospitals, navy yards, naval stations, and receiving ships are, in general, reported to be in good condition. The exceptions are that the navy yard at League Island, Pa., where "there is no regular system of sewers on the island.—A wooden box drain 12 by 12 inches extends from the northwest corner of building No. 1, yards and docks, to the Delaware River. This receives the discharges from closets, washstands, etc., from the buildings along its course. It is a temporary structure, and will require frequent renewal. Some drains from buildings discharge into the ditch, the water from which is used for drinking and cooking by some of the residents of the island."—And at the Norfolk Navy Yard the sewers are badly distributed, and some of them are in a dangerous condition.

The inadequacy of the Naval Hospital, New York (Brooklyn), is particularly dwelt upon as being wholly out of proportion to the present ordinary needs, and, above all, to the possible needs in the event of an epidemic of cholera.

The greatest complement that can be treated in the hospital with safety is 105, allowing accommodations for 98 men and 7 officers, with an allowance of only 1210 cubic feet of air-space per man, while every well-equipped modern hospital at the present day provides 4500 cubic feet per head hourly. The necessity for unlimited supply of fresh air is one of the most important points to be considered in hospital construction, but has not been followed or scarcely approached in this establishment; and besides this deficiency, rotten and uneven floors, bad walls, bad plumbing, and defective heating exist.

During the year there were 4400 officers, sailors, and marines

at the station, from time to time, entitled to hospital treatment. The yard was visited by twenty-one sea-going ships, carrying a combined complement of 3760 officers and men, and remaining at the yard from 1 to 394 days.

During the months of April, May, and June there were in the harbor of New York 349 officers of our own service, and probably more than twice that number belonging to foreign services.

"It has always been the custom to extend the privileges of hospital treatment to officers and men of foreign navies when they are in the port of New York, returning a like courtesy extended to American officers and sailors when abroad. Had anything unusual occurred in the health of our own and foreign squadrons during the recent naval review at New York, we would have not only been found unprovided with accommodations for our own sick, but obliged to suffer the mortification of being utterly unable to look out for the sick of the several foreign fleets represented."

Legislation is urged to meet these deficiencies.

Sick quarters and sanitation continue to be deplorably deficient on board naval vessels, including those of the most recent construction, the *New York* being a striking example. The result of an investigation on this subject, in process at the time of making this report, with recommendations for improvement, is promised at an early date.

The disgraceful status of the Medical Corps, regarding rank and position, is again urged upon the attention of the Secretary of the Navy and Congress, as it has been repeatedly by the predecessors of the present Surgeon-General. Only the *same privileges* are asked for the Medical Corps of the Navy as are granted for like service in the Army, where the status of the Medical Corps is clearly defined by law, and with an established rank, perfectly satisfactory to that branch of the service. Moreover, it is recommended that

"The title of Surgeon-General should be changed to Medical Director-General, more appropriate for the Navy, and should constitute a permanent grade, as in the Army, to be promoted by selection and to hold office until retirement by age. This officer should also be Chief of Bureau of Medicine and Surgery.

"The title of Medical Director should remain unchanged; that of medical inspector to fleet surgeon; surgeon to staff surgeon; passed assistant surgeon, an absurd title, to that of surgeon; assistant surgeon, another uncomplimentary title for a professional man, to surgeon junior grade."

Recommendations which commend themselves to all persons with knowledge of the naval service, and which should certainly be favorably acted upon by Congress.

Lack of uniformity and comprehensiveness in the sanitary reports of medical officers has impressed the Bureau with the necessity of introducing some system which will secure greater accuracy in their preparation, and to accomplish this result, instructions covering the subject are promised at an early date.

The health of the Navy for the year appears to have been exceptionally good. Mean strength of the Navy and Marine Corps, including officers and men for the year, 11,775. Mean strength afloat, 9846. Total number of patients under treatment for the year in naval hospitals, 1503; navy yards and stations, 2233; vessels afloat and receiving ships, 7460; total sick, 11,196.

Deaths from all causes in naval hospitals, 50; at navy yards and stations, 19; on board vessels afloat and receiving ships, 31: 100.

Ratio per 1000 of the deaths in the Navy and Marine Corps, 8.49; in the force afloat, 3.14.

The chief causes of death were: Ambustio (all on board vessels), 12; pneumonia, 9; morbi val. cordis, 8; phthisis, 7; febris enterica, 7; alcoholism, 4.

The Museum of Hygiene, in charge of Medical Director A. C. GORGAS, is greatly embarrassed for want of room, the present building being inadequate for the proper display of the material there collected, and without sufficient room for laboratory work and quarters. In the portion of the building occupied by the museum, the ground floor being reserved for the dispensary and offices of the attending surgeons, there are about 8000 square feet of available space. For an advantageous disposition of the articles now on view, double that space is desirable, and at the present rate of growth in a few years still more will be required.

The library now numbers upward of 12,000 volumes; but there is a deficiency in works especially devoted to hygiene and bacteriology, and in modern works of every description. Dr. Gorgas renews the recommendation of his predecessor in last year's report, that a regular annual appropriation of $5000 be asked for to purchase books, exhibits, apparatus, and for other purposes.

The Causes and Origin of Continued Fevers with Reference to Naval and Military Services, by Surgeon C. A. SIEGFRIED, and *Observations on Normal Growth and Development of the Human Body by Systematized Exercise*, by Surgeon HENRY G. BEYER, papers read at the Pan-American Medical Congress, September, 1893; and *Notes on Naval Hospitals, Medical Schools, and Training School for Nurses, with a Sketch of Hospital History*, a paper prepared for the Section on Hospital Care of the Sick, First Aid to the Injured and Training of Nurses, International Congress of Charities, Correction, and Philanthropy, Chicago, Ill., June, 1893, by Passed Assistant Surgeon J. D. GATEWOOD, are particularly valuable contributions to the report, from which we expect to make abstracts hereafter.

ANNUAL REPORT OF THE SUPERVISING SURGEON-GENERAL OF THE UNITED STATES MARINE HOSPITAL SERVICE FOR THE FISCAL YEAR ENDING JUNE 30TH, 1892.

Although a year late, this report is by no means without interest. It comprises the beginning of the National Quarantine Service under the new *régime*, and the subversion of practical sanitation by the twenty days' detention proclamation, signed by the President, September 1st, 1892. We are gratified to observe, however, no record of that document—at least it is not indexed, and time is too precious to be spent in a search for it. "Camp Low," elaborately displayed as it is, is quite sufficient to mark the event as an attempted return to the mediæval method of encouraging epidemic diseases. Otherwise the descriptions of the national quarantine plants and refuge stations and marine hospitals, severally, are creditable to the service.

During the year the total number of patients treated in the service was 53,610, of which number 16,022 were treated in hospitals, the remainder being office or dispensary patients. The number of deaths was 479—from disease, 442 ; from injury, 37. Deaths at quarantine stations, 3.

The magnitude of the work of the service is indicated by the receipts and expenditures, as follows :

Balance available at the commencement of the year, $75,528.01 ; receipts from all sources, $650,510.39 ; expenditures, $586,839.06, leaving on hand, at the close of the year, a balance of $139,199.34, a net increase of $63,671.33.

The subject above all others which has engaged the attention of the Bureau and attracted public attention during the year, as already well known through these pages, has been the protection of the public health ; and since the passage of the National Quarantine Law (SANITARIAN, Vol. XXX., p. 222), in February last, the Surgeon-General has won golden opinions by the conciliatory exercise of his functions, in co-operation with the State and port sanitary authorities at home, and the institution of an efficient sanitary inspection service at ports of departure abroad. To the detail of this service the report is for the most part devoted ; but as of it our readers have been informed *au courant*, we have no need to recapitulate. It is the beginning of a new work—international sanitation—for which THE SANITARIAN has, from its outset, contended—from which there should be no turning back. Sanitary inspection of vessels at *our home ports* before departure is surely now in order, if we would secure thorough international co-operation ; and until that is also comprehended, the United States Marine Hospital Service will have but half covered its sphere.

REPORT OF WILLIAM T. JENKINS, M.D., HEALTH OFFICER OF THE PORT OF NEW YORK, FOR THE YEAR 1892.

Impatience at the delay of this report should be satisfied with a knowledge of the conditions fully explained. Dr. Jenkins' conflict with cholera at well-nigh the outset of his service was quite enough to have engaged his attention, but the epidemic of pretentious knowledge urged on him by a sensational

press was a good deal more embarrassing ; but with this our readers are already familiar.

The number of vessels from foreign ports inspected during the year was 5383 ; the number of vessels from domestic ports, south of Cape Henlopen, inspected between May 1st and November 1st, was 1952 ; the number of immigrants inspected was 388,486 ; the number of cabin passengers arriving during the year was 120,981.

More than twice as many vessels and nearly five times as many passengers as arrived at Philadelphia, Boston, and Baltimore combined.

Immigrants received on Hoffman Island, 4616 ; died on Hoffman Island, 2 ; transferred from Hoffman Island, 51 ; discharged from Hoffman Island, 2565 ; baths given to immigrants, 2634 ; number of pieces fumigated (sulphur), 4355 ; number of pieces disinfected (steam), 10,390 ; number of pieces disinfected (corrosive sublimate solution), 6067 ; cases of illness treated, 111.

Transferred to Swinburne Island (hospital), asphyctic cholera patients, 64 ; mild cases, 8 ; suspects, 56 : 128. Deaths at Swinburne Island, of cholera, 20 ; other causes, 4 ; at other places in port, of cholera, 24 ; other causes, 8. At sea, cholera (?), 76. Bodies cremated at Swinburne Island, 60.

Small-pox cases transferred to hospital from vessels arriving in quarantine, 24.

All these statistics are given in detail, connected with the vessels and ports of departure severally.

For this service the financial statement is : For inspection of vessels, foreign, $24,022.50 ; domestic, $3166. Night boarding, transportation, vaccination, raised the total receipts to $48,466.47, a sum more than sufficient to meet the expenses of the service, and leave a balance of about $1700.

The expense incurred by the purchase of Fire Island by Governor Flower, and the expenditure of Camp Low at Sandy Hook, and other expenses incurred by the Treasury Department, were a wholly useless waste of money, caused by the senseless panic, for which the Health Officer was in no way responsible.

And with regard to these appendages, THE SANITARIAN fully agrees with its esteemed contemporary, the *New York*

Medical Journal, that "the best thing the State of New York and the United States can do with Fire Island and Camp Low, respectively, is to dispose of them and thus get rid of them. They are vestiges of that fifteenth-century system that gave origin to the word which we now accept as signifying maritime sanitation, rather than forty days' detention of suspected or exposed persons."

From Journal of the American Medical Association, November 11th, Dr. John B. Hamilton, editor:

New York Quarantine Methods.—The following report on New York quarantine methods appears in the Savannah *News* of October 17th:

"The Norwegian steamship, *Lyderhorn*, which arrived up Sunday night, was sent back down to quarantine by Health Officer Brunner yesterday morning for disinfection.

"The reason for this order of the Health Officer was a letter received from the Inspector of the Marine Hospital Service at New York, containing a copy of a report upon the vessel by the Inspector to the Surgeon-General at Washington. The information was sent to Savannah by order of the Surgeon-General.

"The case of the *Lyderhorn* places the management of the quarantine service at the port of New York in a very bad light. The letter received by Dr. Brunner was from Dr. J. J. Kinyoun, Inspector of the Marine Hospital Service at the port of New York. He enclosed a copy of a report made to the Surgeon-General, which he had been ordered to send to Dr. Brunner. Dr. Kinyoun's report to the Surgeon-General was as follows:

"'UNITED STATES MARINE HOSPITAL SERVICE, MIDDLE ATLANTIC DISTRICT, PORT OF NEW YORK, SURGEON-GENERAL'S OFFICE, October 23, 1893.

"'SIR: I have the honor to report that a steamer called the *Lyderhorn* from Sourabaya, Java, with a cargo of sugar, arrived in New York on September 30th. On October 10th the vessel came down to the New York Quarantine with the request from the agents, Funch, Edye & Co., to have the vessel thoroughly disinfected in order that there would be no detention at the Savannah Quarantine. I feel it my duty to inform you what the process of disinfection was, and what was done for the vessel. The vessel was empty, one compartment containing considerable dunnage.

"'The hatches were opened and a bucket containing about two pounds of a mixture of manganese dioxide and salt,

moistened with water, was made ready to lower in each compartment. Then sulphuric acid was poured over this mixture, and the bucket lowered into each compartment. The disinfection, so called, was accomplished within twenty minutes, after which the vessel proceeded to sea. About ten pounds of the mixture was used. No disinfection of the apartments of the crew or cabin ; in fact, while the alleged disinfection was going on some of the men were at their breakfast in the forecastle.

The Health Officer gave a certificate that the vessel had been thoroughly disinfected. The fee charged for this was $10.

"'Very respectfully,

"'J. J. KINYOUN,

"'*P. A. Surgeon, M. H. S. Inspector.*'"

To the foregoing the following is Dr. Jenkins's reply :

(Copy.)

HEALTH OFFICER'S DEPARTMENT, QUARANTINE, S. I., November 2, 1893.

Dr. W. F. Brunner, Health Officer, Savannah, Ga.:

SIR : Upon my return from Chicago I found a clipping from a Savannah paper, with a printed letter of Dr. Kinyoun, who had been invited here at the earnest solicitation of the Supervising Surgeon-General of the United States Marine Hospital Service upon the arrival of the *Karamania*, infected with cholera from Naples, for the purpose of inspecting baggage which was supposed to be treated by the Marine Hospital Service abroad ; this vessel's baggage having been inspected instead of disinfected abroad, and the passengers had not undergone any detention at Naples. His duty, as I understood the matter, went no further.

The steamer *Lyderhorn* arrived here on September 30th from Sourabaya and other Eastern ports, touching at Suez and Gibraltar on the voyage ; her cargo was sugar, and being free from infection and not in any sense a danger to the community, she was permitted to go to her dock and discharge cargo, where she remained ten days without any developments or even a suspicion of infection. When she was about to clear for Savannah the agents asked, in order to avoid detention in quarantine at Savannah, that this department should grant a certificate. We gave her the simple fumigation in the holds, which were empty.

I was informed by Kinyoun that he had notified you or the Surgeon-General, but I paid no attention to it, because I had every reason to expect that the success of this department in handling infected ships would be the best guarantee of the healthful condition existing on board of this vessel, which has clearly demonstrated the facts above stated. As to the comments of the letter in the clipping before me that I have been criticised for mismanagement, permit me to say that it has come from sources influenced by strong partisanship or from those who were desirous or ambitious to secure control of this service, which they could not do by a manly course of fighting on merit and by open manly debate of the question, but have endeavored to do so by false statements and efforts of detraction.

If your board or any other quarantine on the Atlantic seaboard can point to one single authenticated case admitted that has passed the inspection of the New York Quarantine, I shall resign in favor of the theoretical, non-practical, and extremely ambitious bureau which attempts to detract from the efficiency of this department, and the abundant evidence of its success so well known to all men having knowledge of its work. It would scarcely be fair for me now to ask you, after taking action, to request that paper to retract its statements.

I send by this mail a copy of the report of the work done at this quarantine during the last year, and if you will carefully read it, particularly the regulations issued in August of last year and the recommendations there made, you will find that it contains in brief the entire regulations issued by the Bureau of the Treasury Department. Further, if you will turn to Appendix G, you will find that the New York State Law has been for a long time ample to meet all emergencies that may arise, caused either by panic, by the issuance of a "twenty day proclamation," or by the criticisms of a bitterly partisan press when desirous to effect the Presidential elections.

I desire to assure you, if I cannot the paper, that "Tammany Hall or its bosses" never require of those honored with positions of trust any other duty than the honorable and con-

scientious discharge of the functions of the offices for which they have been selected.

Yours truly,

(Signed) WILLIAM T. JENKINS,
Health Officer.

DR. HAMILTON ON THE CHANDELEUR ISLAND STATION.

CHICAGO, ILL., November 15, 1893.

Editor of THE SANITARIAN :

MY DEAR SIR : My attention has been called to an article on Chandeleur Quarantine Station (SANITARIAN, November number), in which you say for this disaster responsibility chiefly rests upon ex-Surgeon-General J. B. Hamilton, and then you make a number of misstatements in regard to the matter.

The station at Ship Island was removed because an act of Congress required it. This act of Congress was passed because of an overwhelming petition made to Senators Walthall and George by the inhabitants of the summer resorts along Mississippi Sound, and also because of fever cases on shore, presumably from contact with ships in quarantine. The Chandeleur site was selected by Captain Stamm, U. S. R. M., Surgeon W. H. H. Hatton, M. H. S., and myself. Dr. Wilkinson, of the New Orleans Board of Health, was in the party, and Dr. H. B. Horlbeck, of Charleston. All concurred in the opinion as to its being a good place for quarantine. The lighthouse on the island had been there for many years.

That storms occur on the coast everybody knows ; that Louisiana was visited by a direful calamity everybody knows, but I am no more responsible for the tidal wave and its great destruction than you are for the destruction of Indianola on the Texas coast, or either of us for the devastation of the Sea Islands on the Atlantic coast.

Your statement that the present Surgeon-General will reinstate the station on Ship Island is scarcely tenable, except as a temporary measure, for even the present Surgeon-General must obey the law, and the law required its *removal* from Ship Island.

Truly yours,

JOHN B. HAMILTON.

RETORT :

The deliberation and assistance with which Dr. Hamilton went about the work with which we charged him in no respect

controverts our statement. The act of Congress, which he pleads, was part of his plan—of *his* procuring. We have never had reason to credit Dr. Hamilton with much practical knowledge of yellow-fever, but we should never suspect him of being so ignorant of it as to have any faith in the alleged danger of a quarantine station at Ship Island to the people on the mainland, five or six miles distant across the water. His citation of the stability of the lighthouse on a sand reef, considering its deep foundation, as evidence of a good foundation for a quarantine plant, is equally far-fetched, as also his distortion of our charge against him. We have almost unlimited confidence in his capabilities in some directions, but nothing could be further from us than to credit him with the tidal wave.

THE PROPOSED BUREAU OF PUBLIC HEALTH, as provided for by the final draft of the bill of the Committee on Quarantine of the New York Academy of Medicine, on other pages, is remarkable for its comprehensiveness of detail, conceived to be necessary by its authors doubtless for the guidance of the extraordinary *personnel* provided, and the conditions of their service. The contrast between this proposition and that of the Chairman of the Committee of the American Public Health Association, which follows, is very striking.

That the health of the people of the United States is worth protecting and promoting is beyond question ; but the suggestion that persons competent to discharge the functions of such a service, as provided for in the bill proposed by the New York Academy, simply for the honor of the service, is so inconsistent with the scope of the service displayed by the proposed measure, as to place the proposition on a par with the usual conditions of physicians' hospital service. It is, in short, the medical practitioner's estimate, without practical knowledge of preventive medicine—of so much less worth than administering physic !

Additional reflection on this proposition more than confirms what we have before said of it. But more anon.

AMERICAN PUBLIC HEALTH ASSOCIATION.

Resolutions Adopted.

CONCORD, N. H., October 25. 1893.

AT the annual meeting of the American Public Health Association, held at Chicago, October 9th–14th, 1893, the following resolution offered by Dr. Henry P. Walcott, of Massachusetts, was adopted.

Resolved, That the American Public Health Association again urge upon Congress the necessity of the appointment of some officer with general sanitary authority in connection with the national Government.

That the functions of such an authority are of sufficient importance to demand the exclusive attention of the best instructed sanitarian.

That such authority should be enabled, from time to time and under proper regulations, to secure the advice and cooperation of the State boards of health.

At the meeting of the INTERNATIONAL CONGRESS OF PUBLIC HEALTH, held under the auspices of the American Public Health Association and the World's Congress Auxiliary of the World's Columbian Exposition, at Chicago, October 10th–14th, 1893, the following resolutions were adopted :

(Offered by Dr. J. E. Monjarás, of Mexico.) *Resolved*, 1*st*, That the educational authorities of the various nations represented here be requested to devote a longer time than they now do, in their curriculum, to the teaching of hygiene.

2*d*, That the governments of the countries represented at this Congress be urged to appoint to sanitary positions and commissions only such persons as may have acquired a special education in sanitary studies.

(Offered by Dr. Benjamin Lee, of Pennsylvania.) *Resolved*, That the International Congress of Public Health affirms in the strongest possible manner its confidence in the value of vaccination as a preventative of small-pox.

(Offered by Mr. Henry Lomb, of Rochester, N. Y.) *Resolved*, 1*st*, That this Congress urge upon the people of the countries here represented, the importance of completing our sanitary organization by forming voluntary Public Health Associations, to study for themselves the conditions of healthy living in the home and the community, and to afford efficient and persistent support to the work of public health officials.

2*d*, That this Congress respectfully ask State and local boards of health to assist in all proper ways the formation of such organizations.

IRVING A. WATSON,
Secretary.

NEW BOOKS AND BOOK REVIEWS.

ANY BOOK reviewed or advertised in THE SANITARIAN costing $1.50 or less will be sent *free* to any present subscriber sending the name of a new subscriber, or to any new subscriber on receipt of the full subscription price sent on his own account; or any book so reviewed or advertised costing more than $1.50 will be sent at a discount of that amount.

INDEX-CATALOGUE OF THE LIBRARY OF THE SURGEON-GENERAL'S OFFICE, U. S. ARMY. Authors and Subjects. Vol. XIV. Sutures-Universally. 4to, pp. 1016. JOHN S. BILLINGS, Surgeon U. S. Army. Government publication.

This volume is characterized by the same comprehensive scope and excellence of execution as the thirteen previous volumes of the same work. It includes 10,124 author titles, representing 6426 volumes and 8850 pamphlets. It also includes 9867 subject titles of separate books and pamphlets, and 38,461 titles of articles in periodicals. Of the particularly copious bibliography in this volume, syphilides and syphilis take up 108 pages; tubercle and tuberculosis, 54; United States (health legislation, climatology, diseases, food products, mineral waters, reports on sanitary subjects, etc.), 52; tetanus, 39; therapeutics, 38; testicle, 33; teeth, 26.

LECTURES ON SANITARY LAW. By A. WINTER BLYTH, M.R.C.S. (England), L.S.A. (London); Fellow of the Institute of Chemistry; Barrister-at-Law of Lincoln's Inn; Professor of Hygiene, College of State Medicine. 8vo, pp. 300. Price, $2.50. London and New York: Macmillan & Co.

This work consists of twelve lectures on sanitary law delivered by the author at the College of State Medicine as part of the usual course of instruction in sanitary science. Although composed with special reference to sanitary law under British authority, it comprises, as no other work hitherto published does, the legal definitions and boundaries of unsanitary conditions and sanitary works, of universal application.

The lectures severally treat of (I.) Sanitary Districts and Authorities: definitions—owner, house, building, drain, sewer, canal, canal-boat.

(II.) Nuisance : at common law—common, private, mixed ; statutory under the public health acts ; premises injurious to health—pools, ditches, and other like matters ; animals, accumulation of deposits, overcrowding, unclean or unventilated factories and workshops, smoke, shafts of abandoned quarry mines.

(III.) Sewerage, Drainage : vesting in the sanitary authority, powers, duties of sanitary authorities ; nuisances from sewers or sewerage ; right to drain into sewers ; disposal of sewage ; house drainage ; what is effectual drainage? site, material, course, connection, etc.

(IV.) Water : water supplies, water-works, protection from pollution, prevention of pollution of streams, etc.

(V.) Sanitary appliances, regulations, by-laws, which must be made by every authority, legal principles, etc.

(VI.) Statutory provision with regard to the prevention of disease : districts which have not adopted notification ; cleansing and disinfecting ; special powers ; contagious diseases of animals ; regulations with regard to milk, dairies, cowsheds, and milkshops ; establishment of hospitals—what is proper lodging and accommodation? Disposal of the infectious dead.

(VII.) Infectious diseases notification and prevention acts ; list of diseases to be notified, who has to notify—duty of authority ; prevention against exposure of infected persons, detention in hospitals, letting for hire infected rooms or houses, special regulations as to milk ; conveyance of infectious dead, burial, infectious rubbish.

(VIII.) Port sanitary law ; merchant shipping act, the old quarantine act ; . . . creation of port sanitary authorities, cholera order, order as to rags, duties of port sanitary officers.

(IX.) The housing of the working classes : unhealthy areas, improvements, demolition, obstructive buildings, etc.; betterment—condition implied on letting houses to working classes.

(X.) Supervision of canal-boats : regulations, conditions precedent registration, age, sex, cubic space ; regulations for cleanliness, etc., and for preventing the spread of infectious diseases ; inhabited canal-boat is a house under sanitary statute.

(XI. and XII.) Metropolitan sanitary law ; London (?) sani-

tary jurisdiction; nuisances: drains, drainage and sewers, inspection; water and water supply, protection from pollution by consumers or others; the closing of polluted wells; when water may be legally cut off, constant supply; prevention of smoke; regulation of offensive trades, factories, workshops, bakehouses; street scavenging and the removal of house, trade, and stable refuse; regulation as to water-closets, public lavatories, and sanitary conveniences; unsound food, infectious diseases, underground rooms—what is occupation of an underground room?

To which is an appendix giving specimens of by-laws in force in the metropolis as to certain offensive trades—tripe boiling, knackers, catgut-makers, gut-scrapers, glue and size manufacturers, blood-driers, fat-melters, and animal charcoal manufacturers.

HANDBOOK OF PUBLIC HEALTH AND DEMOGRAPHY. By EDWARD F. WILLOUGHBY, M.D., London Diploma in State Medicine of the London University, and in Public Health of Cambridge University. 12mo, pp. 525. Illustrated. Price, $1.50. London and New York: Macmillan & Co.

"The present work, though under a different title, is in fact a third edition, greatly enlarged and improved, of the 'Principles of Hygiene,' which was published by Messrs. Collins in 1884 and 1888 in their series of 'Advanced Science Text-Books.'" The first chapter is on the "Health of Man," divided into three sections—dietetics, clothing, and personal hygiene; and habits, exercise, rest, etc. The food stuffs are described under the light of the most recent investigations of Pettenkofer, Voight, and others of the Munich school, based upon exact experimental knowledge, classified, according to their composition rather than their source, as animal and vegetable, "since the albuminates are common to both; the essential difference between animal and vegetable foods—viz., the absence of carbohydrates, milk and sugar excepted, from the one, and the very small proportion of fat in the other, is lost in the free inclusion of milk, butter, and eggs (!) in so-called *vegetarian* dietaries."

The potential energy and the quantity of food stuffs required are discussed from the same standpoint, together with the analytical results of Moleschott, Playfair, Beneke, and

Forster. The composition and nutritive value of the principal articles of food, and the effects of an excess or undue preponderance of one kind or another, are given in detail.

Alcoholic drinks are considered with special reference to their source and composition ; malt liquors and wine according to the most reliable analyses of their constituents, tabulated. Beer is chiefly or solely valued as an alcoholic drink, though according to the tables it commonly contains 6 to 8 per cent of extractive nutriment, and some kinds 10 to 15 per cent. The drowsiness induced by beer is attributed to the oil of hops, for wines of the same alcoholic strength are devoid of the same stupefying effects. Summed up under the head of "The Use and Abuse of Alcohol," the physiological effects and pathological results of the use of alcoholic liquors are clearly described, with the apparent acceptance of the conclusion of Dr. Gairdner, "than whom it would be hard to name a more judicious authority," that "amid the wear and tear, the fag and worry, the disjointed and imperfect machinery of human life, we believe that alcoholic drinks are at times a very necessary medicine, at times a very useful help, at times a very enjoyable and harmless luxury, and in none of these respects are we willing to disown them when honestly tested by experience and kept within bounds by reason and prudence." Tea, coffee, and cocoa ; vinegar, condiments, and ice are tersely considered under the same head—qualities, uses, abuses, and dangers.

Cooking, preparation and preservation of foods, and calculation of dietaries are particularly useful sections, more or less suited to every sphere of life and livelihood. Sound and unsound meat ; diseases of cattle as affecting the fitness of their flesh for food ; diseased corn and vegetables and adulteration of food, are so many admirable lessons for every sanitary inspector.

Clothing and personal hygiene includes bedding and bedclothes, errors and follies in dress, dust and dirt, baths and bathing, parasites, etc. The materials in clothing and their special adaptation to different ages and conditions are well described, with the observation that, "in many respects a perfect attire for both sexes is realized in Dr. Jäger's woollen clothes." The importance of frequent if not daily ablutions is dwelt upon, and good discrimination shown in describing

baths and bathing. Habits, exercise, rest, etc., including sleep, are comprised in the concluding section of this chapter, and, except most of what is said about heredity, commendable. The alleged heredity of acquired habits and vices, divested of environment, is alike inconsistent with the physiological evolution of the organic cell and impartial observation, and obstructive of efficient reformatory measures.

Health of the house, which follows, very thoroughly deals with the subject in all its details, from site to finish—soil, aspect, ventilation, warming, lighting, sanitary arrangement, and fixtures.

Health of the city, in like manner beginning with the water supply, comprises a description of the best conditions, tests of impurities, and how to prevent them ; position and fittings of cisterns ; filtration ; disposal of refuse of all kinds ; sewerage works ; irrigation ; river pollution ; disposal of the dead.

Health of the people is also a comprehensive chapter, describing communicable diseases, how they are spread, and the means of preventing them ; school hygiene—buildings, furnishing, and pupils ; health in the workshop—special liabilities of operatives to disease in different industries and needful protection.

Under the head of demography is summed up the most facile and the most accurate means of estimating population, birth, and death-rates, with numerous lucid examples, and comparative mortality of various professions and trades.

Meteorology, including an illustrated description of meteorological instruments and how to use them, and health resorts (of England), with special reference to the truth of Pettenkofer's witticism about people going for change of soil rather than air, is a brief but practical chapter of universal application.

Legislation and health, the concluding chapter, is an enumeration of British acts and provisions relating to the public health ; and following this an appendix, comprising tables of weights and measures, and analytical tables of the more important articles of food.

Altogether it is an admirably concise and lucid treatment of preventive medicine, alike commendable to general readers, teachers, students, physicians, and sanitary inspectors.

A HANDBOOK OF INVALID COOKING. By MARY A. BOLAND, Instructor in Cooking in the Johns Hopkins Training School for Nurses. 12mo, pp. 318. Price, $2. New York: The Century Company.

This book contains a good deal more than the title indicates. It is divided into two parts—Explanatory Lessons and Recipes. Explanatory lessons take up seventy-two pages, comprising a description of the preparation, chemical and physical changes of food; atmospheric and other elements; composition and principal chemical compounds of the human body; the food principles; milk, digestion and nutrition: essential knowledge to a practical appreciation of the second part—recipes.

These include, besides the choice of material, practical directions for compounding, cooking, and serving; and diet lists or *menus* for the sick—liquid diet, light diet, convalescent's diet, and differential *menus* for spring, summer, autumn, and winter. *Rice* is a surprising omission, except as an addition to soups and the preparation of rice-water, considering its superiority in nutritive value and digestibility, particularly as compared with potatoes, which are rather overdone in the variety of ways of tempting the appetite to their use instead of better food. The potential energy of rice, compared with potatoes, weight for weight, is about 4 to 1.

"The feeding of children" rightly begins with insistence upon mother's milk exclusively during the first ten or twelve months of life, if the mother is healthy and can supply it in sufficient quantity; and excellent directions follow with regard to the choice of substitutes, and their mode of preparation suitable to age.

District nursing is the subject of the concluding chapter, briefly utilizing that which has preceded to nursing among the poor and destitute in certain sections of cities, as an established part of a nurse's work. It comprehends teaching as well as other assistance, for, as the author well observes, "There is no way in which one may reach the hearts and sympathies of the poor so quickly as by helping them to or showing them how to do for themselves those things which they think they need."

It is an excellent handbook, not only for nurses in training

schools, hospitals, and others who have the special care of the sick, but a book of much practical utility to every housewife and mother.

ASIATIC CHOLERA: ITS GENESIS, ETIOLOGY, FACTORS, CLINICAL HISTORY, PATHOLOGY AND TREATMENT. By JOHN A. BENSON, Professor of Physiology and Associate Chief of the Department of Clinical Medicine, College of Physicians and Surgeons of Chicago, Ill.; Member of American Anthropometric Society, of American Medico-Psychological Society, of the Chicago Pathological Society. 12mo, pp. 248. Illustrated. Chicago: The J. Harrison White Company.

This book is a careful compilation of a course of lectures by the author, to the class at the College of Physicians and Surgeons of Chicago, in the winter of 1892–93, evincing a very close study of the subject from the most reliable sources, and well adapted to the comprehension of medical students. An appendix comprises Professor Koch's instructions for bacteriological examination, with illustrations of *spirilla choleræ Asiaticæ*, sterilizing apparatus, bathing apparatus, and instruments for enteroklysis treatment.

NOTES AND NOTICES.

CLIMATIC CONDITIONS.—It is the general idea that the further north one goes the colder the climate, but in the Great Northwest, from Iowa north to the Peace River Valley, and even on to the shores of the Great Slave Lake, a range of nearly twenty degrees of latitude, climatic conditions are essentially the same. It is a region marked by great heat in summer and intense cold in the winter. Many illustrations might be given to show this similarity of climatic conditions over such a wide extent of territory, but one or two must suffice. Hon. J. W. Taylor, who for nearly a quarter of a century prior to his recent death had been the consul of the United States at Winnipeg, and to whom I am indebted for many of the facts contained in this article, says: "The prairie's firstling of the spring has the popular designation of crocus, but it is an

anemone—*A. Patens*, the purple anemone, the wind flower—but I prefer the children's name, suggested by its soft, furry coat, the 'gosling' flower, which, with its delicate lavender petals, is fully ten days in advance of other venturesome spring blossoms. It is often gathered on the Mississippi bluffs near the Falls of St. Anthony on April 15th. It appears simultaneously on the dry elevations near Winnipeg. It was observed even earlier, on April 13th, during the Saskatchewan campaign of 1885, and is reported by Major Butler in his 'Wild North Land' as in profusion on Peace River, 1500 miles from St. Paul, on April 20th. Even beyond 1000 miles, on the Yukon, within the Arctic Circle, Archdeacon McDonald, a missionary of the Church of England, has gathered the flower on May 14th. Equally significant as this delicate herald of the spring are the records of ice obstruction in the rivers, their emancipation being simultaneous from Fort Snelling, Minnesota, to Fort Vermilion, Athabasca."—*From Mr. S. A. Thompson's article, "Possibilities of the Great Northwest," November Review of Reviews.*

BERMUDA AND THE WEST INDIES.—Invalids or others seeking equitable, temperate, and healthful climates for the winter should not fail to read Dr. Nelson's article on "Three Climates of Jamaica" in this number, or to what THE SANITARIAN has frequently had to say of Bermuda, with an average temperature of 68° throughout the winter, beautiful scenery, good roads, yachting, fishing, etc., and excellent society, Bermuda being headquarters for the British North American Squadron and the Army. Moreover, cable communication is now established. The *Trinidad*, one of the favorite ships of the New York, Bermuda and West India Line, is now rebuilding, and promises to be out in January with more than double her former power. It is anticipated the voyage will be made in forty-eight hours, and the ship will make three round trips monthly.

THE FRUITS OF CALIFORNIA.—What is the gross yield from these trees? Like wheat, or any other staple crop, the average per acre is very much less than one would expect.

There are often such heavy losses from late frosts, drought, insect pests, and fungoid diseases that only a person of more than ordinary intelligence can successfully manage large or-

chard interests. The average orchard, like the average farm, just about makes a fair living for an industrious man.

There are in California about 500,000 acres of the trees and vines which produce these 600,000,000 pounds of fresh fruit. That is 1200 pounds to the acre, worth in the orchard from $12 to $40, the average gross value of the crop from an acre of fruit. Of course, many of the trees are not yet in bearing, and some fruit-growers will always have far better returns than this.—*Charles H. Shinn, in The Popular Science Monthly for December.*

"TRAMPING WITH TRAMPS" is a unique article in the November *Century*, being a record of the actual adventures of a young American who disguised himself as a tramp and took to the road. The following is an extract from the article :

"Of the States in the Western district, I think that Illinois, Iowa, Wisconsin, Minnesota, Colorado, Washington, and a part of California are the best for tramps.

"New England, as a whole, is at present poor begging territory for those vagabonds who are not clever and not able to dress fairly well. I am sure that I could travel through New England to-day, if respectably clad, and be gratuitously entertained wherever I should go ; and simply because the credulity of the charitable is so favorable to 'travelling gentlemen.' Why? Because the farmers 'considered themselves repaid by the interesting accounts of our travels, and talks about politics,' etc.

"One of the main reasons why Massachusetts is such poor territory for the usual class of vagrants is its district-jail system. In many of these jails the order and discipline are superb, and work is required of the prisoners—and work is the last thing a real tramp ever means to undertake."

HARPER'S MAGAZINE for November completes the eighty-seventh volume in a manner worthy the long life and high character of that periodical. The opening article is the second in Mr. Edwin Lord Weeks's description of his journey from the Black Sea to the Persian Gulf by caravan, and the frontispiece illustrates an interesting family group set in a characteristic Persian landscape. Engravings of fourteen additional drawings by Mr. Weeks and a portrait of the late

Theodore Child accompany the article. Mr. Frederick R. Coudert contributes a timely paper on "Arbitration," Colonel T. A. Dodge writes of "Riders in Turkey," and Daniel Roberts relates "A Reminiscence of Stephen A. Douglas." The number is generous in fiction. William Black's "The Handsome Humes" reaches its conclusion, and, besides Mr. Pater's Imaginary Portrait, there are three short stories, all good.

NEW subscribers to *Littell's Living Age* can obtain a set of the Personal Memoirs of General P. H. Sheridan, U. S. A., in *two large octavo volumes, handsomely bound* in half seal, and *The Living Age* from the date of the receipt of their subscriptions to the close of the year 1894, for only $9.

Write the publishers, Littell & Co., Boston, Mass., concerning this and other offers.

AMERICAN TEXT-BOOK OF GYNÆCOLOGY.—Mr. W. B. Saunders, Publisher, of Philadelphia, Pa., announces this work as ready for early issue. It is the joint work of Drs. Howard Kelley, Pryor, Byford, Baldy, Tuttle, and others who stand before the profession for all that is progressive in gynæcology. The work will contain operations not before described in any other book, notably ablation of fibroid uterus. It is designed as a profusely illustrated reference book for the practitioner, and every practical detail of treatment is precisely stated.

AMERICAN TEXT-BOOK OF DISEASES OF CHILDREN will be edited by DR. LOUIS STARR. This work, as well as the "Gynæcology," will contain a large number of beautiful illustrations, a great number of which are originals. In point of perfection it will be far in advance of any single volume work on "children" yet issued, and will contain as many colored and full-page illustrations, as is usually put in works of four and five volumes; yet the price will be uniform with the "American Text-Book of Surgery."

VOL. II. of the AMERICAN TEXT-BOOK OF THE THEORY AND PRACTICE OF MEDICINE is now in the printer's hands, and will be placed in the hands of the medical profession shortly. In the first volume nearly two hundred pages are from the pen of DR. WILLIAM PEPPER, and in the second volume he writes over three hundred pages, thus making over one fourth of the entire work from the editor.

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